2007 GOES HI-PERF 300S
SERVICE MANUAL

FOREWORD

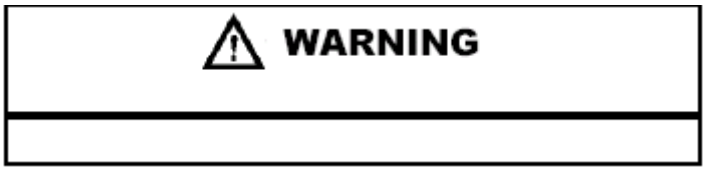
This service manual is designed primarily for use by certified Goes Master Service Dealer technicians in a properly equipped shop and should be kept available for reference. All references to left and right side of the vehicle are from the operator's perspective when seated in a normal riding position.

Some procedures outlined in this manual require a sound knowledge of mechanical theory, tool use, and shop procedures in order to perform the work safely and correctly. Technicians should read the text and be familiar with service procedures before starting the work. Certain procedures require the use of special tools. Use only the proper tools as specified.

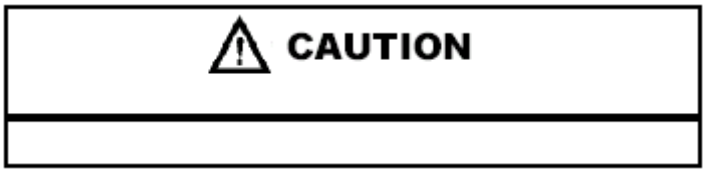
SERVICE MANUAL GOES 300 S

UNDERSTANDING MANUAL SAFETY LABELS AND DIRECTIONS

Throughout this manual, important information is brought to your attention by the following symbols:



SAFETY ALERT WARNING indicates a potential hazard that may result in severe injury or death to the operator, bystander or person(s) inspecting or servicing the vehicle.



SAFETY ALERT CAUTION indicates a potential hazard that may result in minor personal injury or damage to the vehicle.

CAUTION indicates special precautions that must be taken to avoid vehicle damage or property damage.

NOTE:

NOTE provides key information by clarifying instructions.

IMPORTANT:

IMPORTANT provides key reminders during disassembly, assembly and inspection of components.

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CHAPTER 1

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MODEL INFORMATION

VIN Identification

Engine Serial Number Location

Whenever corresponding about an engine, be sure to refer to the engine serial number. This information can be found stamped on the top LH side of the crankcase as shown below.

Vehicle Identification Number Location

The vehicle identification number (VIN) and engine serial number are important for identification purposes. See the illustrations.

GENERAL SPECIFICATIONS
MODEL:GOES 300 S

ENGINE		DRIVE SYSTEM	
Type	4 Stroke, Simple overhead camshaft	**Oil capacity/ type**	900 CC/ 80w90
Displacement	272.3 cc	**Transmission selection**	Forward, Neutral, Reverse
Cooling	Water cooled	**Clutch type**	Centrifugal clutch
Bore and stroke	72.7mm×65.6mm	**Final drive**	Chain
Compression ratio	10.2 : 1	**Forward gear ratio**	17/45* 30/47
Number of valve	2 Rocker arm activated	**Reverse gear ratio**	17/49* 21/37* 30/47
Inlet valve Ø	30.5mm	**Rear Sprocket ratio**	15/36
Inlet valve clearance	0.10mm	**CHASSIS**	
Exhaust valve Ø	26.5mm	**Frame**	Steel
Exhaust valve clearance	0.10mm	**Front suspension**	Duel sock with double wishbone
Lubrication	Wet sump and pump pressurized	**Front wheel travel**	115 mm
Recommended oil	0W/ 50	**Rear suspension**	Single shock with swing Arm
Oil capacity	1800 CC	**Rear wheel travel**	165 mm
Starting system	Electric start and coil start	**Front brake**	Duel disc with single bore caliper
Max. power	14kw/6500rpm	**Rear brake**	Single Disc with single bore caliper
Max. torque	22Nm/5500rpm	**Combined brake**	Foot pedal
CARBURATOR		**Parking device**	Cable controlled parking through rear caliper
Type	Keihin /PTG/ ACV	**Front tire**	21×7-10
Slide valve	B34	**Rear tire**	20×10-9
Main jet	108	**DIMENSIONS**	
Pilot jet	38S	**Overall length**	1820 mm
Jet needle	2MKNN	**Overall width**	1150 mm
Needle clip position notch	4th step from top	**Overall height**	1160 mm
Air screw	1.0 circuit	**Seat height**	790mm
Idle RPM	1400±100	**Wheelbase**	1300mm
ENG. ELECTRICAL		**Max. permissible weight**	173Kg
Charging system	Alternator and voltage regulator	**Number of seats**	2
Alternator output	180W@6000RPM	**Min. ground clearance**	170mm
Ignition type	CDI	**Dry weight**	205Kg
Spark plug type	NGK/ DPR7EA-9	**Front track**	1125 mm
Spark plug gap	0.6~0.7mm	**Rear track**	1125 mm
RPM limiter setting	8500 rpm	**Fuel tank capacity**	8.5 Liter
Battery type	GTX12-BS	**Max. speed**	86 km/hr
Fuse type	Charge 30A/ Main 15A/ Light 10A/ Spare 15A		

GENERAL VEHICLE INSPECTION AND MAINTENANCE

Pre-Ride / Daily Inspection Perform the following pre-ride inspection daily, and when servicing the vehicle at each scheduled maintenance. • Tires - check condition and tire pressure • Fuel and oil - fill both to their proper level; Do not overfill • All brakes - check operation	• Throttle - check for free operation • Headlight / Taillight / Brake light - check operation of all indicator lights and switches • Engine stop switch - check for proper function • Wheels - check for loose wheel nuts • Air cleaner element - check for dirt or water; clean or replace • Steering - check for free operation, noting any unusual looseness in any area • Loose parts - visually inspect vehicle for any damaged or loose nuts, bolts or fasteners

Vehicle Component Inspection Location

GENERAL SPECIFICATIONS

MODEL:TREETRENTAR 330 ON ROAD

ENGINE		DRIVE SYSTEM	
Type	4 stroke simple overhead camshaft	**Oil capacity/ type**	900 CC/ 80w90
Displacement	272.3 cc	**Transmission selection**	Forward, Neutral, Reverse
Cooling	Water cooled	**Clutch type**	Centrifugal clutch
Bore and stroke	72.7mm×65.6mm	**Final drive**	Chain
Compression ratio	10.2 : 1	**Forward gear ratio**	17/45* 30/47
Number of valve	2 rocker arm activated	**Reverse gear ratio**	17/49* 21/37* 30/47
Inlet valve Ø	30.5mm	**Rear axle ratio**	15/36
Inlet valve clearance	0.10mm	**CHASSIS**	
Exhaust valve Ø	26.5mm	**Frame**	Steel
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CARBURATOR		**Parking device**	Cable controlled parking through rear caliper
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Spark plug gap	0.6~0.7mm	**Rear track**	1125 mm
RPM limiter setting	8500 rpm	**Fuel tank capacity**	8.5 Liter
Battery type	GTX12-BS	**Max. speed**	86 km/hr
Fuse type	Charge 30A/ Main 15A/ Light 10A/ Spare 15A		

Vehicle Component Inspection Location

Glossary Of Terms

ABDC: After bottom dead center.

ACV: Alternating current voltage.

Alternator: Electrical generator producing voltage alternating current.

ATDC: After top dead center.

BBDC: Before bottom dead center.

BDC: Bottom dead center.

BTDC: Before top dead center.

CC: Cubic centimeters.

Center Distance: Distance between center of crankshaft and center of driven clutch shaft.

Chain Pitch: Distance between chain link pins (No. 35 = 3/8" or 1 cm). Goes measures chain length in number of pitches.

CI: Cubic inches.

Clutch Buttons: Plastic bushings which aid rotation of the movable sheave in the drive and driven clutch.

Clutch Offset: Drive and driven clutches are offset so that drive belt will stay nearly straight as it moves along the clutch face.

Clutch Weights: Three levers in the drive clutch which relative to their weight, profile and engine RPM cause the drive clutch to close and grip the drive belt.

Crankshaft Run-Out: Run-out or "bend" of crankshaft measured with a dial indicator while crankshaft is supported between centers on V blocks or resting in crankcase. Measure at various points especially at PTO.

CVT: Centrifugal Variable Transmission (Drive Clutch System)

DCV: Direct current voltage.

Dial Bore Gauge: A cylinder measuring instrument which uses a dial indicator. Good for showing taper and out-of-round in the cylinder bore.

Electrical Open: Open circuit. An electrical circuit which isn't complete.

Electrical Short: Short circuit. An electrical circuit which is completed before the current reaches the intended load. (i.e. a bare wire touching the chassis).

End Seals: Rubber seals at each end of the crankshaft.

Engagement RPM: Engine RPM at which the drive clutch engages to make contact with the drive belt.

ft.: Foot/feet.

Foot Pound: Ft. lb. A force of one pound at the end of a lever one foot in length, applied in a rotational direction.

g: Gram. Unit of weight in the metric system.

gal.: Gallon.

ID: Inside diameter.

in.: Inch/inches.

Inch Pound: In. lb. 12 in. lbs. = 1 ft. lb.

kg/cm2: Kilograms per square centimeter.

kg-m: Kilogram meters.

Kilogram/meter: A force of one kilogram at the end of a lever one meter in length, applied in a rotational direction.

l or ltr: Liter.

lbs/in2: Pounds per square inch.

Left or Right Side: Always referred to based on normal operating position of the driver.

m: Meter/meters.

Mag: Magneto.

Magnetic Induction: As a conductor (coil) is moved through a magnetic field, a voltage will be generated in the windings. Mechanical energy is converted to electrical energy in the stator.

mi.: Mile/miles.

mm: Millimeter. Unit of length in the metric system. 1 mm = approximately .040".

Nm: Newton meters.

OD: Outside diameter.

Ohm: The unit of electrical resistance opposing current flow.

oz.: Ounce/ounces.

Piston Clearance: Total distance between piston and cylinder wall.

psi.: Pounds per square inch.

PTO: Power take off.

qt.: Quart/quarts.

Regulator: Voltage regulator. Regulates battery charging system output at approx. 14.5 DCV as engine RPM increases.

Reservoir Tank: The fill tank in the liquid cooling system.

Resistance: In the mechanical sense, friction or load. In the electrical sense, ohms, resulting in energy conversion to heat.

RPM: Revolutions per minute.

Seized Piston: Galling of the sides of a piston. Usually there is a transfer of aluminum from the piston onto the cylinder wall.

Possible causes: 1) improper lubrication; 2) excessive temperatures; 3) insufficient piston clearance; 4) stuck piston rings.

Stator Plate: The plate mounted under the flywheel supporting the battery charging coils.

TDC: Top dead center. Piston's most outward travel from crankshaft.

Volt: The unit of measure for electrical pressure of electromotive force. Measured by a voltmeter in parallel with the circuit.

Watt: Unit of electrical power. Watts = amperes x volts.

WOT: Wide open throttle.

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PERIODIC MAINTENANCE CHART

Periodic Maintenance Overview

Careful periodic maintenance will help keep your vehicle in the safest, most reliable condition. Inspection, adjustment and lubrication of important components are explained in the periodic maintenance chart.

Inspect, clean, lubricate, adjust and replace parts as necessary. When inspection reveals the need for replacement parts, use genuine Goes parts available from your dealer.

NOTE: Service and adjustments are critical. If you're not familiar with safe service and adjustment procedures, have qualified dealer perform these operations.

Maintenance intervals in the following chart are based upon average riding conditions and an average vehicle speed of approximately 10 miles per hour. Vehicles subjected to severe use must be inspected and serviced more frequently.

Severe Use Definition

- Frequent immersion in mud, water or sand
- Racing or race-style high RPM use
- Prolonged low speed, heavy load operation
- Extended idle
- Short trip cold weather operation

Pay special attention to the oil level. A rise in oil level during cold weather can indicate contaminants collecting in oil sump or crankcase. Change oil immediately if the oil level begins to rise. Monitor the oil level, and if it continues rise, discontinue use and determine the cause or see your dealer.

Maintenance Chart Key

The following symbols denote potential items to be aware of during maintenance:

■ = CAUTION: Due to the nature of these adjustments, it is recommended this service be performed by authorized GOES dealer.

◆ = SEVERE USE ITEM -- See Above

NOTE: Inspection may reveal the need for replacement parts. Always use genuine Goes parts.

⚠ WARNING
Improperly performing the procedures marked with a■ could result in component failure and lead to serious injury or death. Have an authorized GOES dealer perform these services.

Pre-Ride - 40 Hour Maintenance Interval

Periodic Maintenance Chart

	ITEM	Maintenance Interval (whichever comes first)			Remarks
		Hours	Calendar	KM	
■	Steering	-	Pre-Ride	-	Check for free operation
◆	Front- Suspension	-	Pre-Ride	-	Make adjustments as needed.
◆	Rear- Suspension	-	Pre-Ride	-	Make adjustments as needed.
	Tire	-	Pre-Ride	-	Make adjustments as needed.
	Brake system	-	Pre-Ride	-	Check Operation
	Auxiliary brake	-	Pre-Ride	-	Inspect daily; adjust as needed.
	Drive chain	-	Pre-Ride	-	Check condition and slack; refer to “drive chain adjustment”
	Brake light	-	Pre-Ride	-	Check for proper operation.
	Throttle	-	Pre-Ride	-	Check Operation
	Wheels/ Fasteners	-	Pre-Ride	-	Make adjustments as needed.
	Frame fasteners	-	Pre-Ride	-	Make adjustments as needed.
◆	Engine oil lever	-	Pre-Ride	-	Make adjustments as needed.
	Air filter	-	Pre-Ride	-	Inspect; clean often, replace as needed.
■	Extension tank coolant	-	Pre-Ride	-	Inspect coolant lever.
◆	Air box sediment tube		Daily		Drain deposits when visible.
	Head lamp/ tail lamp		Daily		Check operation; apply dielectric grease if replacing.
	CVT housing		Weekly		Drain water as needed, check often if operating in wet conditions.
■	Brake lever travel	10H	Monthly	150	Inspect regularly.
◆	Brake freeplay	10H	Monthly	150	Inspect regularly.
■	Spark plug	10H	Monthly	150	Clean; check condition; adjust gap; replace as needed.
	Idle speed	10H	Monthly	150	Check; adjust as needed.
■	Choke	10H	Monthly	150	Check for proper operation.
	Battery	20H	Monthly	300	Check terminals; clean; test.
■ ◆	Engine oil change * Severe duty **Normal Duty	30H 50h	6M 12M	500 1000	Perform a break-in oil change at 20 hours, change more frequently during cold weather
■	Radiator	40H	12M	650	inspect external surface; change coolant
◆	Transmission oil change	40H	12M	650	Inspect level; change yearly; perform break-in oil change after the **first 10 hours** of operation.
◆	Oil pre-filter screen	40H	12M	650	Clean filter at every oil change;

■ Perform these procedures more often for vehicles subjected to severe use.

◆ Have an authorized GOES dealer perform these services.

50 - 300 Hour Maintenance Interval

Periodic Maintenance Chart

	ITEM	Maintenance Interval (whichever comes first)			Remarks
		Hours	Calendar	KM	
◆	General lubrication	50H	3M	800	Lubricate all grease fittings, pivots, & cables.
■	Carburetor float bowl	50H	6M	800	Drain bowl periodically and prior to storage.
■	Throttle cable	50H	6M	800	Inspect; adjust; lubricate; replace if necessary.
■	Choke cable	50H	6M	800	Inspect; adjust; lubricate; replace if necessary.
◆	Carburetor intake flange	50H	6M	800	Inspect for proper sealing / air leaks.
■	Brake pads wear	50H	6M	800	Inspect; replace as needed.
■	Drive belt	50H	6M	800	Inspect; replace as needed.
	Shift linkage & cable	50H	6M	800	Inspect; adjust; lubricate; replace if necessary.
◆	Front suspension	50H	6M	800	Inspect; lubricate; tighten fasteners.
◆	Rear suspension	50H	6M	800	Inspect; lubricate; tighten fasteners.
■	Fuel system	100H	12M	1500	Check for leaks at tank cap, lines, fuel valve, filter, carburetor, replace lines every two years.
■	Fuel filter	100H	12M	1500	Replace yearly.
◆	Engine mounts	100H	12M	1500	Inspect.
◆	Exhaust muffler/ pipe	100H	12M	1500	Inspect.
■	Ignition timing	100H	12M	1500	Inspect.
◆	Wring	100H	12M	1500	Inspect for wear, routing, security; apply dielectric grease to connectors subjected to water, mud, etc.
■	Clutch (drive & driven)	100H	12M	1500	Inspect; clean; replace worn parts.
■	Front wheel bearings	100H	12M	1500	Inspect; replace as needed.
◆	Valve clearance	100H	12M	1500	Inspect; adjust.
◆	Ignition timing	100H	12M	1500	Inspect
◆	Brake fluid	100H	12M	1500	Change every two years.
■	Toe adjustment	-	-	-	Inspect periodically; adjust when parts are replaced.

■ Perform these procedures more often for vehicles subjected to severe use.

◆ Have an authorized Goes dealer perform these services.

GENERAL VEHICLE INSPECTION AND MAINTENANCE

Frame, Nuts, Bolts and Fastener Inspection

Periodically inspect the torque of all fasteners in accordance with the maintenance schedule. Check that all cotter pins are in place. Refer to specific fastener torques listed in each chapter.

Standard Torque Specifications

The following torque specifications are to be used as a general guideline. There are exceptions in the steering, suspension, and engine areas. Always consult the exploded views in each manual section when available for torque values of fasteners before using standard torque.

Standard Fastener Torques

Thread Size	TORQUE (ft. lbs. / in. lbs.)	TORQUE (Nm)
5 mm bolts and nuts	39-52 in. lbs.	4.5-6 Nm
6 mm bolt and nuts	69-104 in. lbs.	8-12 Nm
8 mm boltsand nuts	13-18 ft. lbs.	18-25 Nm
10 mm bolts and nuts	22-29 ft. lbs.	30-40 Nm
12 mm bolts and nuts	36-43 ft. lbs.	50-60 Nm
4 mm screws	22-30 in. lbs.	2.5-3.4 Nm
5 mm screws	30-43 in. lbs.	3.5-5 Nm
6 mm Hex bolts	87-121 in. lbs.	10-14 Nm
8 mm Hex bolts	17-22 ft. lbs.	24-30 Nm
10 mm Hex bolts	25-32 ft. lbs.	35-45 Nm

Maintenance Quick Reference

	Item	Lube Rec.	Method	Frequency
1	Engine oil	OW-50 Synthetic	Check level or change oil	Check during pre-ride inspection change oil every 30 hours or 6 months.
2	Transmission	SAE80W-90 Gear Lubricant	Check level or change lube.	Inspect periodically and change lubrication every 40 hours or annually.
3	Brake fluid	DOT-4 Brake Fluid	Fill master cylinder reservoir to indicated lever inside reservoir.	As require. Change fluid every 2 years.
4	Drive Chain	Chain Lube or SAE 80W/90	Lubricate drive chain	Lubricate as required and before each ride in wet conditions. More often in severe use.
5	Front Suspension A-Arm and Spindle)	Premium All Season Grease	Inspect; tighten fasteners; grease zerks	Every 3 months or 50 hours (also after washing ATV or driving in water). More often in severe use

Re-Coil Starter and Operation

If the battery becomes too weak to start the engine, use the re-coil starter to start the engine until the battery is serviced.

1. Position the vehicle on a level surface.
2. Shift the transmission into neutral (if equipped).
3. Lock the parking brake.
4. Push the engine stop switch up to the RUN position.
5. Turn the key ON.
6. Pull the re-coil to crank the engine.

⚠ WARNING

Always stop the engine and refuel outdoors or in a well ventilated area.

Do not smoke or allow open flames or sparks in or near the area where refueling is performed or where gasoline is stored.

Do not overfill the tank.

Fill the tank to the bottom of the filler neck.

This will allow for thermal expansion.

If you get gasoline in your eyes or swallow gasoline, see your doctor immediately.

If you spill gasoline on your skin or clothing, immediately wash it off with soap and water and change clothing.

Never start the engine or run it in an enclosed area.

Gasoline powered engine exhaust fumes are poisonous and can cause loss of consciousness and death in a short time.

Throttle Stop Speed Control System

IMPORTANT: This procedure should be performed by *consumers only* when they determine that their child is capable of handling the additional speed.

FUEL SYSTEM AND AIR INTAKE

Fuel System Safety

⚠ WARNING

Gasoline is extremely flammable and explosive under certain conditions.

Choke Cable Adjustment

Verify free play of **1.6-4.76 mm (1/16-3/16")** and smooth operation of choke cable.

Adjustments to the freeplay can be made by loosening the choke cable adjustment in or out to gain the desired freeplay.

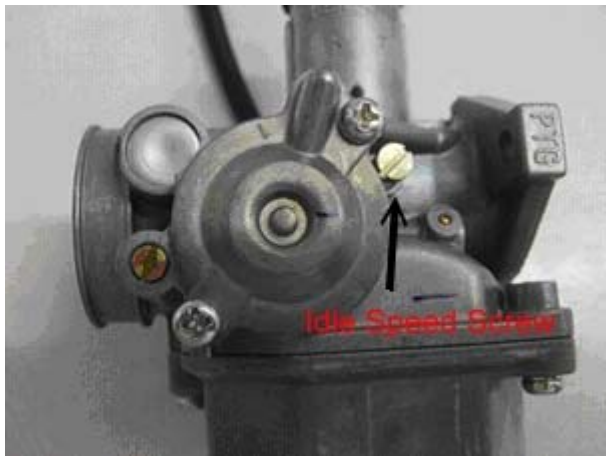
If smooth choke operation is not obtainable, inspect choke cable for kinks or sharp bends in routing.

Idle Speed Adjustment

1. Start engine and warm it up thoroughly.
2. Adjust idle speed by turning the slide adjustment screw in (clockwise) to increase or out (counterclockwise) to decrease RPM. (Refer to illustration).

Idle Speed
1400 ± 100 r.p.m.

NOTE: Adjusting the idle speed affects throttle cable freeplay. Always check throttle cable freeplay after adjusting idle speed and adjust if necessary.



Fuel Lines

1. Check fuel lines for signs of wear, deterioration, damage, or leakage. Replace if necessary.
2. Be sure fuel lines are routed properly and secured with cable ties.

⚠ CAUTION
Make sure all fuel lines and vent lines are not kinked or pinched.

3. Replace all fuel lines every two years.

Air Screw Adjustment

1. Set idle speed to specification. Always check throttle cable freeplay after adjusting idle speed and adjust if necessary.
2. To adjust the mixture screw setting, you will need to use the Adjustment Screwdriver. Slowly turn the mixture screw clockwise until engine idle RPM begins to decrease. Stop turning at this point.
3. Slowly turn mixture screw counterclockwise until idle speed returns to maximum RPM. Continue turning counterclockwise until idle RPM begins to drop. Stop turning at this point.
4. Center the mixture screw between points in Step 2 and 3.
5. Readjust idle speed if not within specification.

Fuel Filter

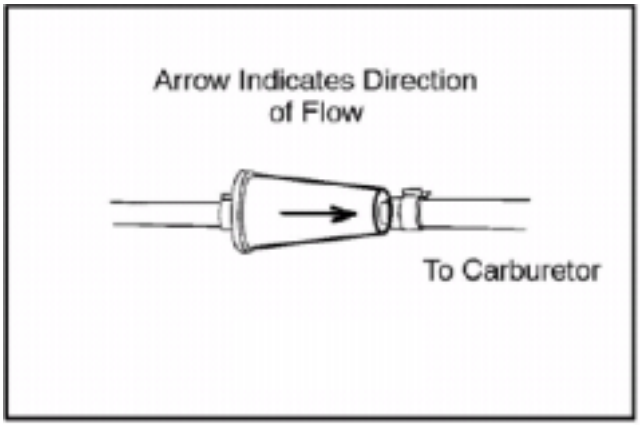
The fuel filter should be replaced in accordance with the "Periodic Maintenance Chart" or whenever sediment is visible
in the filter.

Fuel Filter Location - Located in-line between fuel valve and carburetor inlet.

To service the fuel filter:

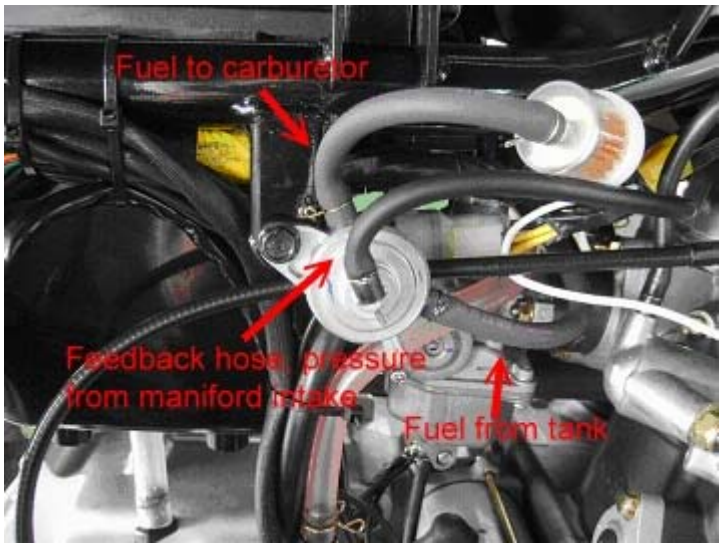
1. Shut off fuel supply at fuel valve.
2. Remove line clamps at both ends of the filter.
3. Remove fuel lines from filter.
4. Install new filter and clamps onto fuel lines.
5. Turn fuel valve to 'ON'.
6. Start engine and inspect for leaks.

Air Screw



Pilot Air Screw Base Setting:
Keihin: 1.0 turns out

Fuel Valve Location



WARNING

Gasoline is extremely flammable and explosive under certain conditions.
Do not smoke or allow sparks in near the area when inspecting fuel valve.

1. Remove vacuum impulse hose and carburetor fuel hose.
2. Install a vacuum gauge into vacuum impulse hose.
3. Inspect gauge keeping pressure ability, if not must replace diaphragm in fuel valve.
4. The gauge is keeping pressure but no fuel from carburetor hose. Inspect fuel filter jam or reroute hoses.

Carburetor Draining

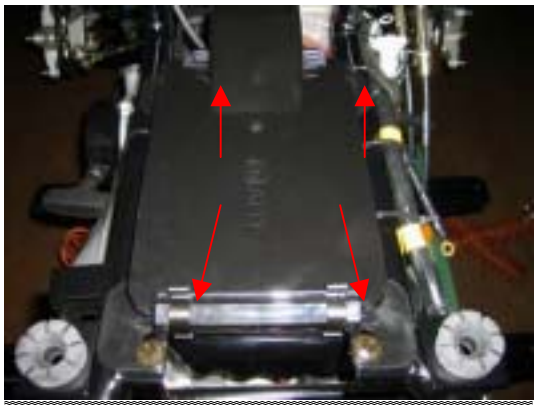
The carburetor float bowl should be drained periodically to remove accumulated moisture or sediment from the bowl, or before extended periods of storage.

1. Place a container beneath the bowl drain hose.
2. Loosen drain screw and allow fuel in the float bowl and fuel line to drain completely.

3. Inspect the drained fuel for water or sediment.
4. Tighten drain screw.
5. Check for fuel leaks.
6. Start engine and re–check for leaks.

Air Filter Service

1. Remove the seat.
2. Release the air box cover spring clips and remove the cover.



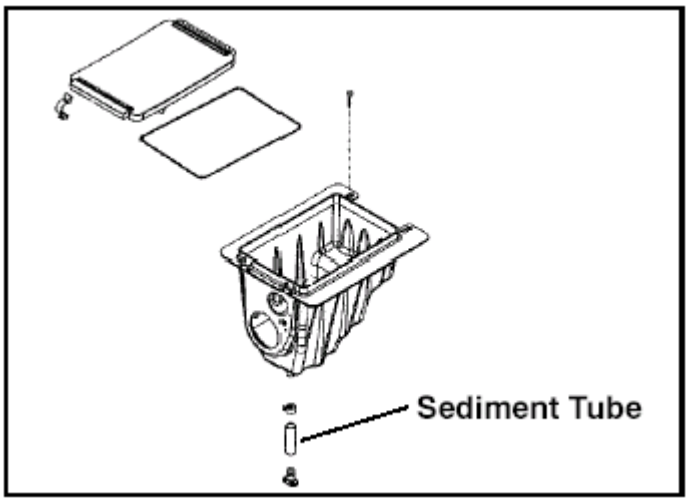
3. Remove the foam air filter. Wash the foam filter in warm soapy water, then rinse and let it dry. If the filter is damaged, install a new foam filter.
4. Apply a commercially available foam filter oil to the foam filter.

5. Inspect the filter support screen and clean away any oil or sediments in the air box.

6. Reinstall the screen, foam filter and air box cover. Secure the clips.
7. Reinstall the seat.

Air Box Sediment Tube

Periodically check the air box sediment tube located toward the rear of the machine. Drain whenever deposits are visible in the clear tube.



NOTE: The sediment tube will require more frequent service if the vehicle is operated in wet conditions or at high throttle openings for extended periods.

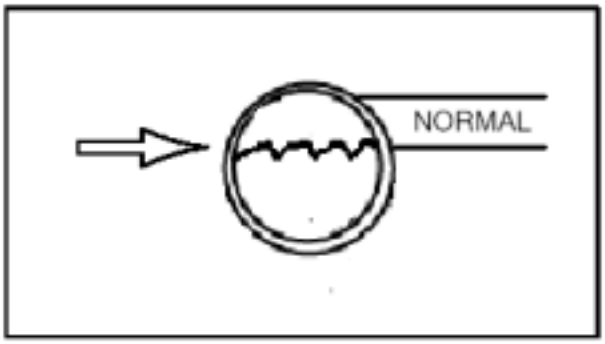
1. Remove the hose clamp and remove the sediment tube.
2. Drain and clean deposits from the tube.
3. Reinstall the tube and clamp.

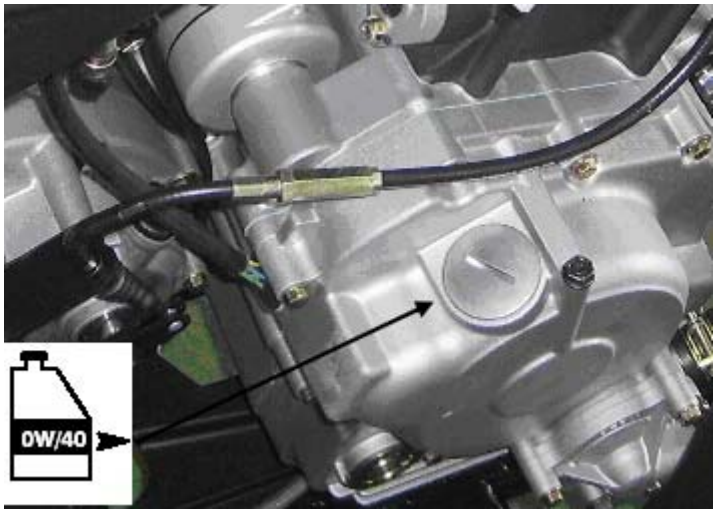
ENGINE

Oil Lever

To check the oil level:

1. Set machine on a level surface.
2. Start and run engine for 20-30 seconds. This will return oil to its true level in the engine sump.
3. Stop engine and check oil level sight glass.
4. Check to see that the oil level is in the 'normal' range. The level should be, at minimum, halfway between to the top of the viewing area. Add oil as needed to reach the indicated level shown. Do not overfill.





NOTE: Do not fill the over the normal oil operating range. Filling over the normal operating range could cause a mist of oil to enter the air box.

NOTE: Rising oil level between checks in cool weather driving, can indicatemoisture collecting in the oil reservoir. If the oil level is over the full mark, change the oil.

Recommended Engine oil:
Synthetic, 0W-40 Above 0 ° C (32 ° F)
Semi-Synthetic 20W-40 Below 0 ° C (32 ° F)

Engine Oil and Filter Change

1. Position the vehicle on a level surface.
2. Clean area around the drain plug.
3. Run engine two to three minutes until warm.
4. Stop the engine.

CAUTION
Hot oil can cause serious burns to skin. Do not allow hot oil to come in contact with skin.

5. Place a drain pan beneath the engine crankcase.
6. Remove the drain plug and pre-filter screen. Allow the oil to drain completely.

7. Wash the oil pre-filter screen with solvent to remove any debris. Allow the screen to air dry.

8. Inspect the O-ring on drain plug, replace if needed.

NOTE: The sealing surfaces on the drain plug and crankcase should be clean and free of burrs, nicks or scratches.

9. Reassemble the pre-filter screen and spring to the pre-filter plug.

10. Reinstall the pre-filter drain plug. Torque to 11 ft. lbs. (15 Nm).

= T
Crankcase Drain Plug: 15 Nm (11 ft. lbs.)

11. Remove the filler. Add 1800 ml (60 oz.) of recommended oil. Do not overfill.

12. Reinstall the filler .

13. Start the engine. Allow it to idle for one to two minutes.

14. Stop the engine and inspect for leaks.

15. Check the oil level. Add oil as needed to bring the level is in the “normal range”.

Compression / Leakdown Test

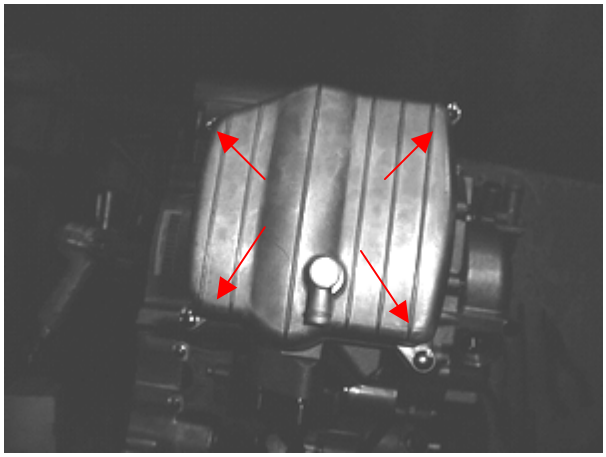
IMPORTANT: Use of a compression tester adaptor that is too long WILL CAUSE DAMAGE to the cylinder head. The adaptor length should be no longer than the length of the spark plug threads 19mm.

Cylinder Compression
Standard: 13~15 kg/cm2 (185 - 215 psi)
Cylinder Leakage
Service Limit: 10%
Inspect if leakage exceeds 10%

Valve Clearance Adjustment

INTAKE / EXHAUST VALVE CLEARANCE

1. Remove the cylinder head cover to expose the intake and exhaust rocker arms.



2. Remove spark plug and rotate engine to TDC on the compression stroke.
3. Insert a 0.1 mm feeler gauge between end of intake valve stem and adjuster screw.
4. If adjustment is required, loosen the locknut and turn adjuster until the proper clearance is obtained.

5. When clearance is correct, hold adjuster screw and tighten locknut securely.
6. Re-check the valve clearance.
7. Repeat steps 3-5 to adjust the exhaust valve clearance.

Valve Clearance - In / Ex: 0.1 mm

Engine Mounts

Inspect engine mounts for cracks or damage.

Engine Fastener Torque

Check engine fasteners and ensure they are tight

CVT Drying

NOTE: If operating the ATV through water, be sure to check the CVT and other components for water ingestion. The ATV should be checked immediately.

There may be some instances when water is accidently ingested into the CVT system. Use the following instructions to dry it out before operating. The drain plug is located on the bottom of the CVT cover.

1. Remove the drain plug located under the CVT housing. Allow the water to drain. Reinstall the drain plug.

2. Shift the transmission into neutral.
3. Start the engine. Apply varying throttle for 10-15 seconds to expel the moisture and air-dry the belt and clutches. Do not hold the throttle wide open for more than 3 - 4 seconds.
4. Allow the engine RPM to settle to an idle speed.
5. Test for belt slippage. If the belt slips, repeat the process.

⚠ CAUTION

Exposure to salt water will cause corrosion to metal components. If the vehicle is operated in salt water areas, rinse it off frequently with fresh water.

TRANSMISSION AND FINAL DRIVE

Transmission Lubrication

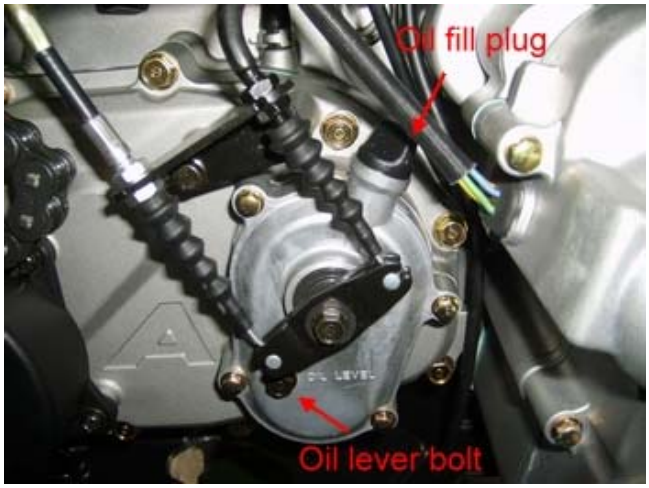
The transmission lubricant level should be checked and changed in accordance with the maintenance schedule. Remember to:

- Verify the vehicle is level before proceeding.
- Verify the vent hose is routed properly and is not obstructed.
- Follow instructions to check / change transmission fluid.

Transmission Lubricant Level

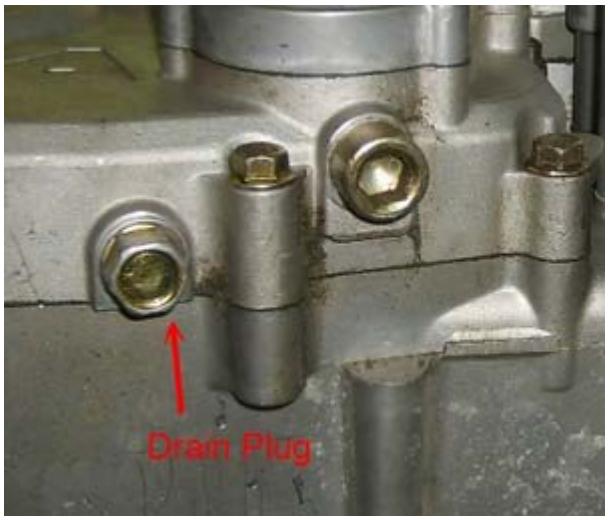
The gear case fill plug is located on the side of the gear case on the right side of the ATV. Maintain the lubricant level at the oil lever bolt be checked monthly and changed annually.

1. Position the vehicle on a level surface.
2. Remove the fill plug and fill plug.
3. View the lubricant level through the fill hole.
4. If the level is low, add the recommended lubricant.
5. Reinstall the fill plug and oil lever bolt.



Transmission Lubricant Change

1. Position the vehicle on a level surface.
2. Remove the fill plug.
3. Place a drain pan beneath the transmission.
4. Remove the drain plug and allow the lubricant to drain completely.



5. Clean and reinstall the drain plug. Torque to 19 Nm (14 ft. lbs.).

= T
Transmission Drain Plug: 19 Nm (14 ft. lbs.)

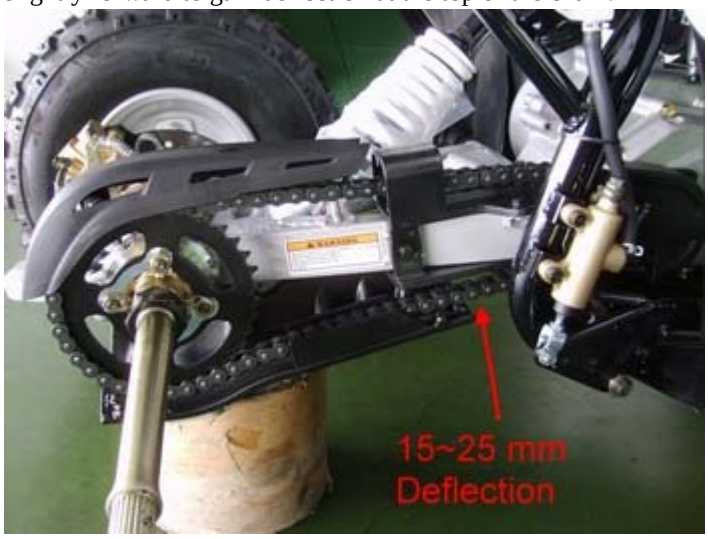
6. Add the recommended lubricant. Maintain the lubricant level at the bottom of the fill plug hole threads.

7. Reinstall the fill plug. Check for leaks.

=
ATV Gearcase Lubricant (AGL): 900 ml (11.8 oz.)

Drive Chain Inspection

1. Check the amount of chain slack by moving the vehicle slightly forward to gain deflection at the top of the chain.



2. The chain should have **6-12 mm (1/4”-1/2”)** deflection. If the chain needs adjustment, use the following procedure.

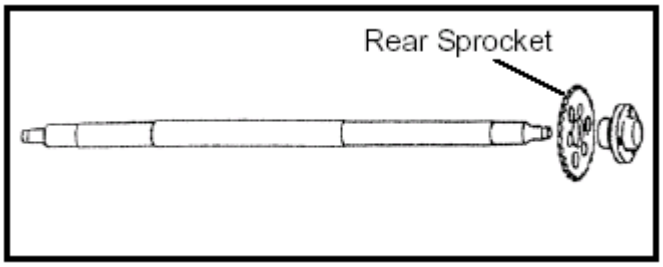
Drive Chain Adjustment

1. Loosen the four rear axle hub mount bolts.

3. Turn the chain adjuster clockwise until chain tension is setting specification.

Sprocket Inspection

Inspect the front and rear sprockets for worn, broken or bent teeth.



To check for wear, pull upward on the chain at the top of the rear sprocket. Replace sprocket if chain movement exceeds 6mm (1/4”).

ELECTRICAL AND IGNITION SYSTEM

Battery Removal

⚠ WARNING

Battery electrolyte is poisonous. It contains sulfuric acid. Serious burns can result from contact with skin, eyes or clothing. Antidote:
External: Flush with water.
Internal: Drink large quantities of water or milk. Follow with milk of magnesia, beaten egg, or vegetable oil. Call physician immediately.
Eyes: Flush with water for 15 minutes and get prompt medical attention.
Batteries produce explosive gases. Keep sparks, flame, cigarettes, etc. away. Ventilate when charging or using in an enclosed space.
Always shield eyes when working near batteries.
KEEP OUT OF REACH OF CHILDREN.

CAUTION

Always wear safety glasses, rubber protective gloves and appropriate clothing when working with batteries.

IMPORTANT: DO NOT activate ATV batteries unless they will be put into service within 30 days of activation.

The ATV has a Low Maintenance style battery. Do not remove the battery cap strip to check acid level or add water once the battery have been activated. Perform the proper battery tests and charge or replace the battery as required.

New batteries must be fully charged before use or battery life will be significantly reduced (10-30% of the battery’s full potential).

To remove the battery:

1. Remove the seat to access the battery.
2. Loosen the strap securing the battery in position.
3. Disconnect the black negative (-) battery cable first.
4. Disconnect the red positive (+) battery cable last.
5. Lift the battery out of the ATV.

⚠ CAUTION
To reduce the chance of sparks: Whenever removing the battery, disconnect the negative (black) cable first. When reinstalling the battery, install the negative cable last.

CAUTION
Low-amperage charger (1.2A): 5~10 Hr.s. **High-amperage charger(12A): 0.5Hr.s.**

NOTE: DO NOT use a constant high-amperage battery charger to charge this style of battery. Use a low-amperage charger capable of charging voltage that is 1/10 of the battery amp-hour rating.

Battery Cleaning

Keep the battery terminals and connections free of corrosion. If cleaning is necessary, remove the corrosion with a stiff wire brush. Wash with a solution of one table spoon baking soda and one cup water. Rinse well with tap water and dry off with clean shop towels. Coat the terminals with dielectric grease or petroleum jelly.

Battery Installation

1. Place the fully charged battery in its holder.
2. Attach the hold-down strap(s).
3. Connect and tighten the red positive (+) cable first.
4. Connect and tighten the black negative (-) cable last.
5. Torque the battery terminal bolts to 4.7 Nm. (3.5 ft. lbs)
6. Verify that the cables are properly routed.

Battery Storage

Whenever the vehicle is not used for a period of three months or more, remove the battery from the vehicle, ensure that it's fully charged, and store it out of the sun in a cool, dry place. Check battery voltage each month during storage and recharge as needed to maintain a full charge.

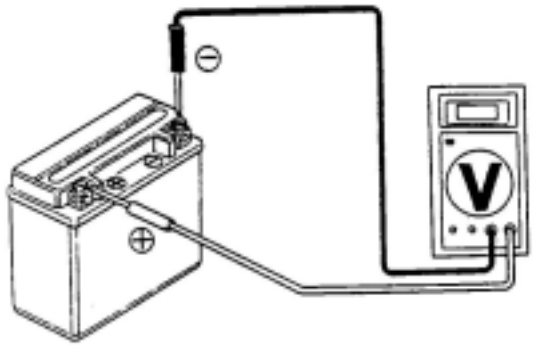
Battery inspection

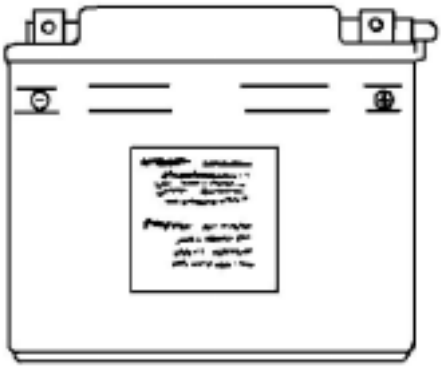
When installing a new battery, make sure it's fully charged prior to its initial use. Using a new battery that has not been fully charged can damage the battery and result in a shorter life. It can also hinder vehicle performance.

Note:

Fully charged: over 12.8 V

Failure charged: under 12.5 V





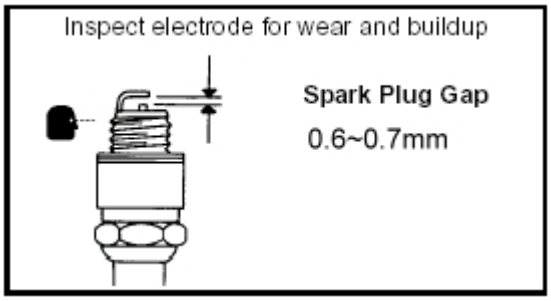
Fuses / Fuse Holder Location

A 15 Amp fuse protects the main electrical system, a 30 Amp fuse protects ignition system and a 10 Amp fuse protects the headlight and taillight. See illustrations for fuse locations.

Spark Plug Inspection

1. Remove spark plug high tension lead. Clean plug area so no dirt and debris can fall into engine when plug is removed.

2. Remove spark plug.
3. Inspect electrodes for wear and carbon buildup. Look for a sharp outer edge with no rounding or erosion of the electrodes.



4. Clean with electrical contact cleaner or a glass bead spark plug cleaner only. **CAUTION: A wire brush or coated abrasive should not be used.**
5. Measure gap with a wire gauge. Refer to specifications for proper spark plug type and gap. Adjust gap if necessary by bending the side electrode carefully.
6. If necessary, replace spark plug with proper type.

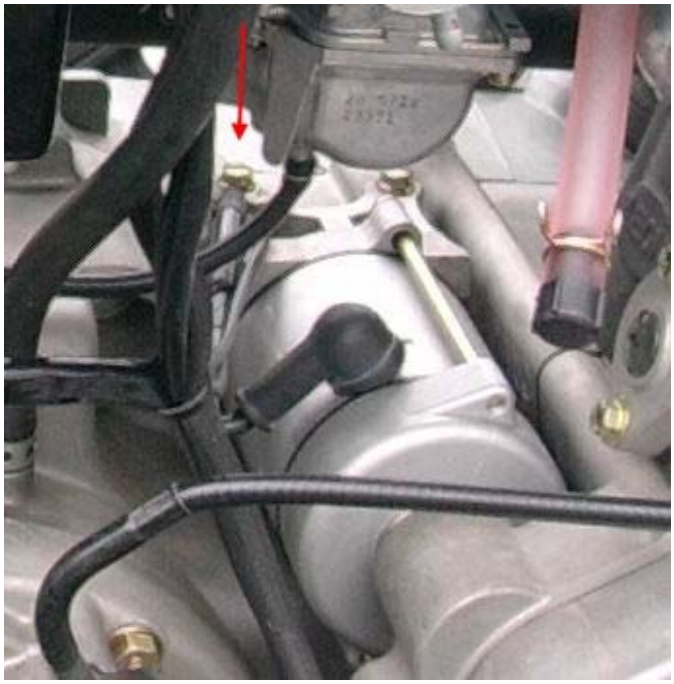
CAUTION: Severe engine damage may occur if the incorrect spark plug is used.

7. Apply a small amount of anti-seize compound to the spark plug threads.
8. Install spark plug and torque to **12~14 Nm (9~11 ft. lbs.)**.

Recommended Spark Plug:
NGK R DPR7EA-9
Spark Plug Torque:
12~14 Nm (9~11 ft. lbs.)

Engine / Frame Ground

Inspect engine-to-frame ground cable connection at the starter motor mount. Be sure it is clean and tight.



STEERING AND SUSPENSION

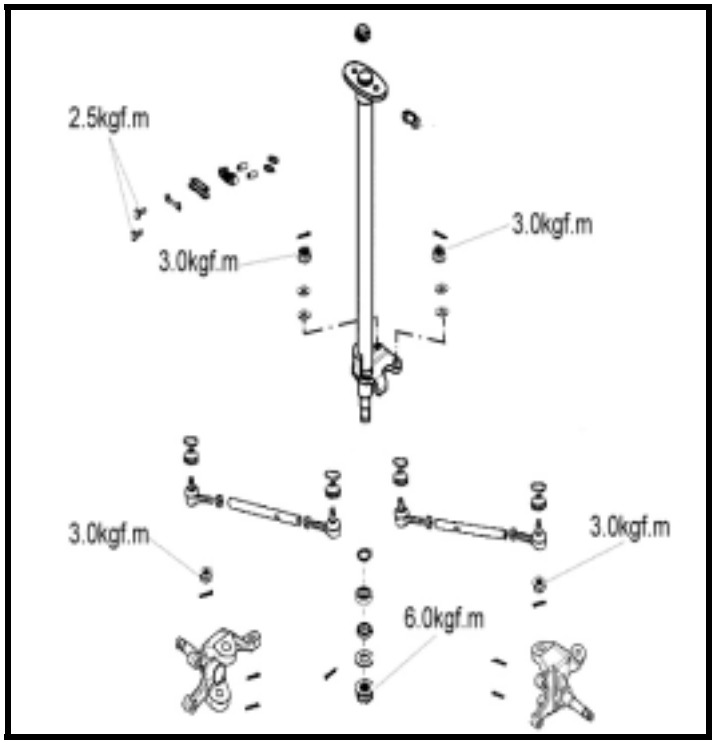
Steering

The steering components should be checked periodically for loose fasteners, worn tie rod ends, and damage. Also check to make sure all cotter pins are in place. If cotter pins are removed, they must not be re-used. Always use new cotter pins.

Replace any worn or damaged steering components. Steering should move freely through entire range of travel without binding. Check routing of all cables, hoses, and wiring to be sure the steering mechanism is not restricted or limited.

⚠ WARNING

Due to the critical nature of the procedures outlined in this chapter, The steering component repair and adjustment be performed by an authorized Goes Dealer. Only a qualified technician should replace worn or damaged steering parts. Use only genuine Goes replacement parts.



Tie Rod End / Steering Inspection

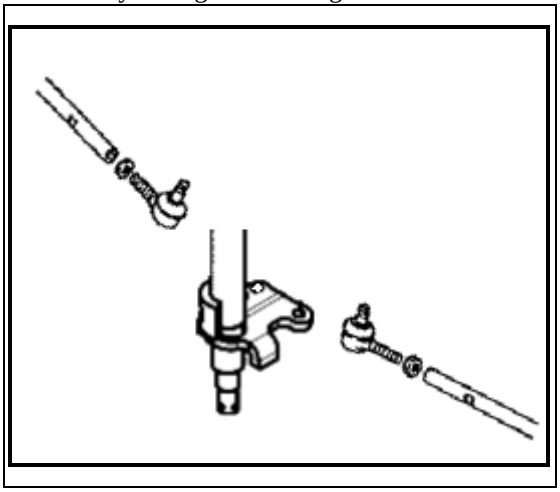
1. Elevate front end of ATV so front wheels are off the ground. Check for any looseness in front hub / wheel assembly by grasping the tire firmly at top and bottom first, and then at front and rear. Try to move the wheel and hub by pushing inward and pulling outward.

2. If abnormal movement is detected, inspect the hub and wheel assembly to determine the cause.

3. Remove the front wheels.

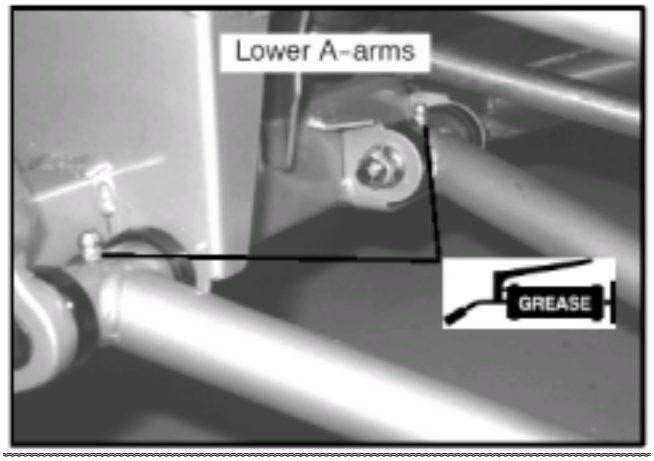
4. Grasp the steering tie rod and ball joint then pull in all directions feeling for movement in the tie rod end.

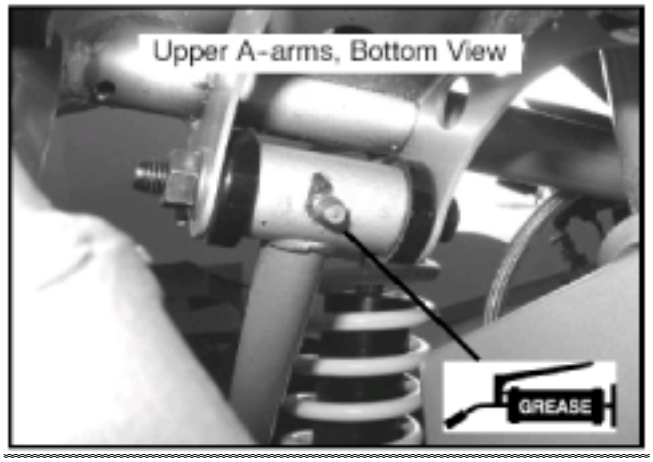
5. Repeat inspection for inner tie rod end (on steering post).
6. Replace any worn steering components. Steering should move freely through entire range of travel without binding.



LUBRICATION / GREASE POINTS

There are grease zerks on the upper and lower A-arms. Apply grease until it is visible on the ends of the pivot points.





Wheel Alignment

⚠ WARNING

Severe injury or death can result from improper toe alignment and adjustment.
All tie rod adjustments should be performed by an authorized Goes dealer.

Use the following procedure to check the toe alignment of the vehicle. The recommended toe alignment is 0- 6 mm toe out.

1. Set the handlebars in a straight-ahead position.

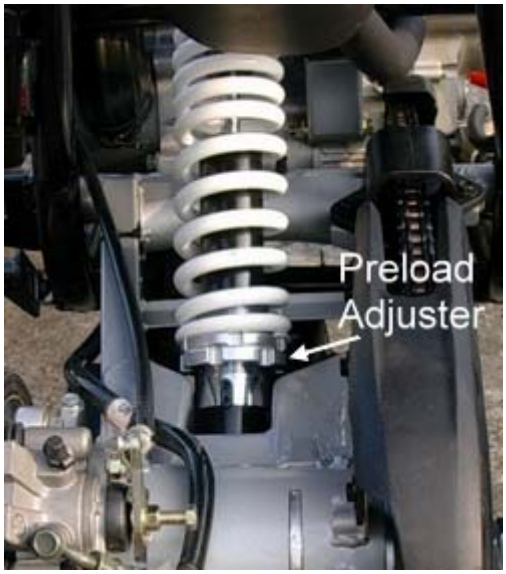
NOTE: The steering arm can be used as an indicator of whether the handlebars are straight. The arm should always point straight back from the steering post.

2. Place the stands in front of the vehicle, perpendicular to the rear tires.
3. Tie an elastic string around the stands, making sure the string just touches the side surface of the rear tires on each side of the vehicle and goes around the stands in front of the vehicle.

Rear Suspension Inspection

Compress and release rear suspension. Damping should be smooth throughout the range of travel.

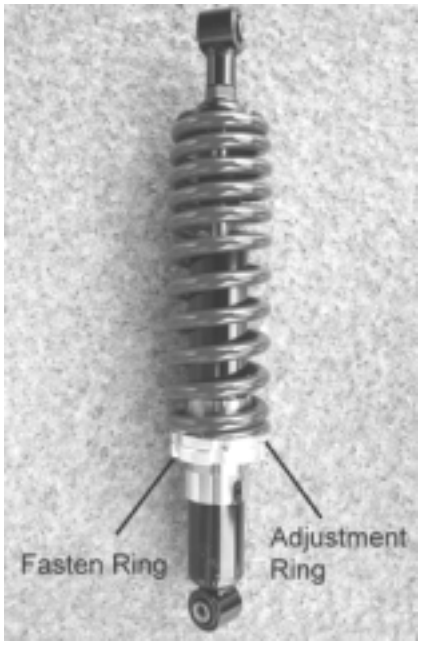
1. Check all rear suspension components for wear or damage.
2. Inspect shock for leakage.



Inspect the rear shock and spring to ensure proper function. If the shock is leaking oil, replace it. Inspect the swing arm and weldments for any sign of damage.

Suspension Spring Adjustment

The rear spring preload can be adjusted. To make preload adjustments, release bottom fasten ring then turn the adjuster ring to increase or decrease the amount of preload.



BRAKE SYSTEM

Brake System Inspection

The following checks are recommended to keep the brake system in good operating condition. Service life of brake system compo nents depends on operating conditions. Inspect brakes in accordance with the maintenance schedule and before each ride.

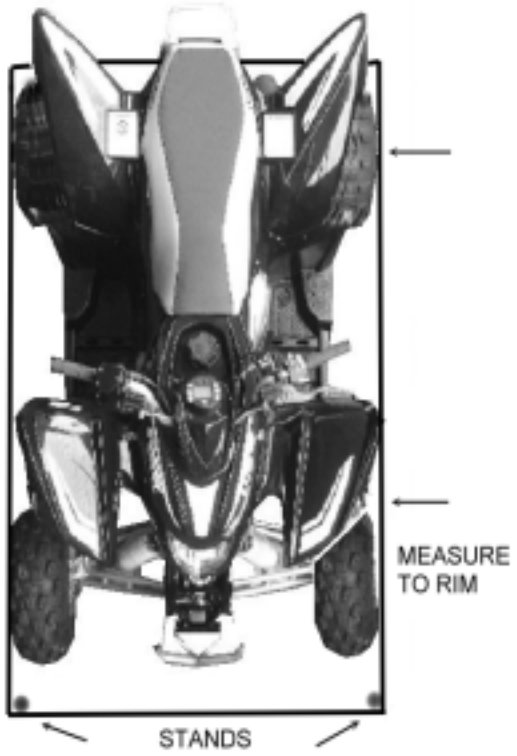
Brake Lever Travel

Check brake lever travel at the intervals recommended in the Periodic Maintenance Chart. Service the brakes when brake lever travel reaches the total lever travel measurement listed in the table below. Always service the brakes when there is no longer sufficient stopping ability at the specified lever travel setting

Component	Total Lever Travel
Front brake lever	80mm (3.15”)
Rear brake lever	50mm (2”)

Brake Lever Travel
Front - 80 mm (3”)
Rear - 50 mm (2”)

4. Measure the distance from the string to the rim at the front and rear of the front rim. Rear measurement should be 2-3 mm more than the front measurement.



Toe Adjustment

If toe alignment is incorrect, measure the distance between vehicle center and each wheel. This will tell you which tie rod needs adjusting.

NOTE: Be sure the handlebars are straight ahead before determining which tie rod(s) need adjustment.

⚠ CAUTION

During tie rod adjustment, it is very important that the following precautions be taken when tightening tie rod end jam nuts.
If the rod end is positioned incorrectly it will not pivot, and may break

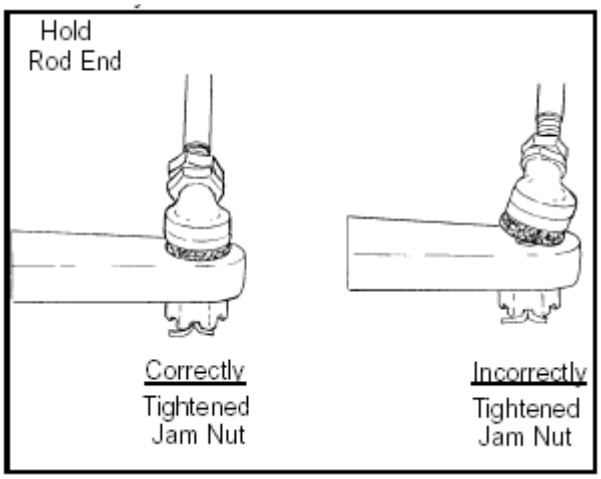
To adjust toe alignment:

• Hold tie rod end to keep it from rotating.

• Loosen jam nuts at both end of the tie rod.

• Shorten or lengthen the tie rod until alignment is as required to achieve the proper toe setting – 0~6mm.

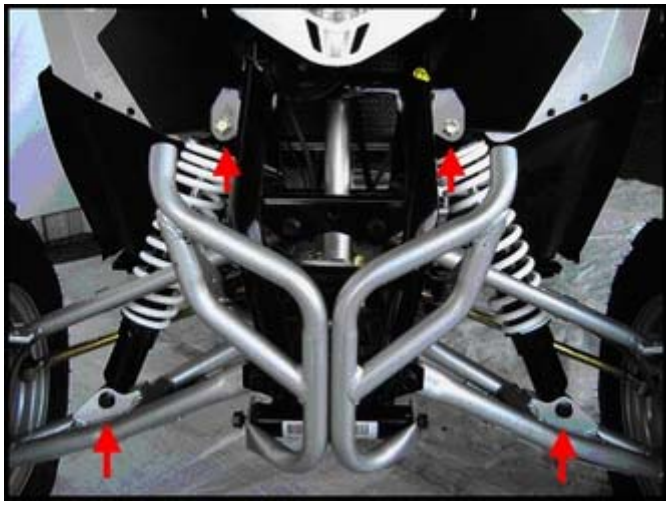
•Important: When tightening the tie rod end jam nuts, the rod ends must be held parallel to prevent rod end damage and premature wear. Damage may not be immediately apparent if done incorrectly. See illustration.



Front Suspension Inspection

Compress and release front suspension. Damping should be smooth throughout the range of travel. Inspect the front shocks and springs to ensure proper function. If the shock is leaking oil, replace it.

Check all front suspension components for wear or damage. Check shock mounting fasteners to ensure they are tight. Inspect A-arm and weldments for any sign of damage.



Parking Brake Adjustment

1. Position the vehicle on a level surface.
2. Shift the transmission into neutral (if applicable).
3. Elevate the rear of the vehicle by placing a suitable stand under the frame. The rear tires should be slightly off the ground.
4. While rotating the rear wheels, adjust the nut at the parking cable.
5. When you begin to feel a slight drag in wheel rotation, loosen the wing nut 1~2 full turn.

6. When fully tight the cable adjusting nut but functions that must adjust rear caliper parking swing arm.
7. Tight back the cable adjusting nut then Loosen the fasten nut at rear caliper.
8. Adjust the bolt when you feel a slight drag in wheel rotation, loosen the wing nut one full turn.
9. Follow the procedure 1~5 to adjust cable adjusting nut.
10. Verify that the left hand brake functions correctly.
11. Carefully lower the vehicle to the ground.

WHEELS AND TIRES

Wheels

Inspect all wheels for runout or damage. Check wheel bolts and ensure they are tight. Do not over tighten the wheel bolts.

Wheel, Hub and Spindle Torque Table

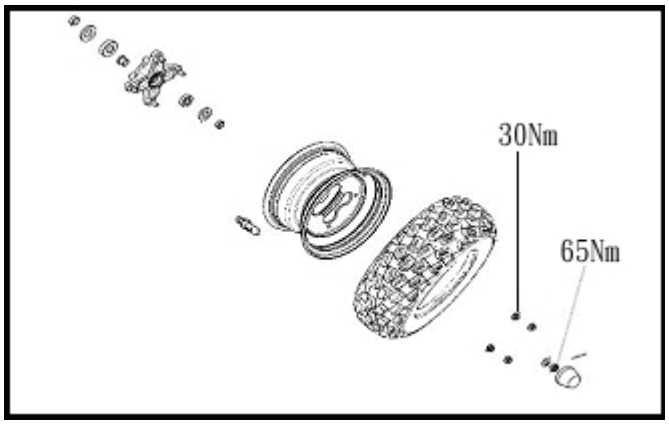
Item	Specification
Front wheel bolts	30Nm(22ft. lbs)
Rear wheel bolts	30Nm(22ft. lbs)
Front spindle nut	65Nm(48ft. lbs)
Rear hub retaining nut	65Nm(48ft. lbs)

Wheel Inspection

Inspect the front and rear wheel bolts for tightness. Re-torque the wheel bolts periodically and check before each ride.

Wheel Removal - Front / Rear

1. Stop the engine, place the transmission in gear and lock the parking brake.
2. Loosen the wheel bolts slightly.
3. Elevate the side of the vehicle by placing a suitable stand under the footrest frame.
4. Remove the wheel bolts and remove the wheel.



Wheel Installation - Front / Rear

1. With the transmission in gear and the parking brake locked, place the wheel in the correct position on the wheel hub. Be sure the valve stem is toward the outside and rotation arrows on the tire point toward forward rotation.
2. Install the wheel bolts and finger tighten them.
3. Lower the vehicle to the ground.
4. Securely tighten the wheel bolts to 22 ft. lbs. (30 Nm)

⚠ CAUTION

If wheels are improperly installed it could affect vehicle handling and tire wear. Be sure to properly torque and install all wheel nuts.

Tire Pressure

Tire Pressure Inspection (PSI - Cold)

Front	Rear
5 psi (34.5 kPa)	5 psi (34.5 kPa)

Tire Inspection

⚠ WARNING

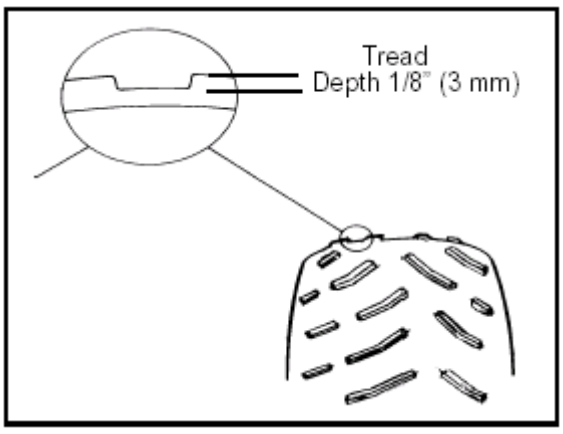
Operating an ATV with worn tires will increase the possibility of the vehicle skidding and possible loss of control.
Worn tires can cause an accident.
Always replace tires when the tread depth measures 0.3 cm (1/8”) or less.

⚠ CAUTION

Maintain proper tire pressure. Refer to the tire pressure warning decal applied to the vehicle.
Improper tire inflation may affect ATV maneuverability.
When replacing a tire always use original equipment size and type.
The use of non-standard size or type tires may affect ATV handling.

Tire Tread Depth

Always replace tires when tread depth is worn to **1/8” (3 mm)** or less.



CHAPTER 3
CVT SYSTEM

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⚠ WARNING

All CVT maintenance or repairs should be performed only by a certified Goes Service Dealer technician who has received the proper training and understands the procedures outlined in this manual. Because of the critical nature and precision balance incorporated into the CVT components, it is absolutely essential that no disassembly or repair be made without factory authorized special tools and service procedures.

The Continuously Variable Transmission (CVT) consists of three major assemblies: 1) The Drive Clutch; 2) The Driven Clutch; and 3) The Drive Belt. The internal components of the drive clutch and driven clutch control engagement (initial vehicle movement), clutch upshift and backshift. During the development of a Goes ATV, the CVT system is matched first to the engine power curve; then to average riding conditions and the vehicle's intended usage. Therefore, modifications or variations of components at random are never recommended. Proper clutch setup and careful inspection of existing components must be the primary objective when troubleshooting and tuning.

CVT Maintenance / Inspection

Under normal operation the CVT system will provide years of trouble free operation. Periodic inspection and maintenance is required to keep the system operating at peak performance. The following list of items should be inspected and maintained to ensure maximum performance and service life of CVT components. See "CVT Overheating / Diagnosis" on page 3.4 for more information.

1. Drive clutch rollers and bushings. Driven clutch rollers, pins, and spring.
2. Clutch sheave faces. Clean and inspect for wear.
3. CVT system sealing. The CVT system is air cooled by fins on the drive clutch. The fins create a low pressure area around the drive clutch. The clutch cover, must be sealed to ensure water and other contaminants entering the CVT area.

Drive Clutch Operation

Drive clutches primarily sense engine RPM. The major component which controls shifting function are the shift centrifugal weights (rollers) inside the moveable sheave. Whenever engine RPM is increased, centrifugal force is created, causing the rollers to push against the cam plate and force the moveable sheave toward the drive belt. This motion pinches the drive belt between the spinning sheaves and causes it to rotate, which in turn rotates the driven clutch. If belt speed is sufficient, centrifugal friction shoes on the driven clutch overcome their return spring pressure and swing outward against the transmission drive hub, and the vehicle (if in gear) begins to move. At lower RPM, the drive belt rotates low in the drive clutch sheaves. As engine RPM increases, centrifugal force causes the drive belt to be forced upward on drive clutch sheaves, changing the ratio of the drive to driven clutch from low to high.

Driven Clutch Operation

CVT driven clutches primarily sense torque, but also react to RPM, applying and retracting the friction shoes according to the forces applied to it from the drive belt, while at the same time reacting to the torque at the transmission input shaft. If the torque resistance at the transmission input shaft is greater than the load from the drive belt, the drive belt is kept at the outer diameter of the driven clutch sheaves (low ratio).

As engine RPM and horsepower increase, the load from the drive belt increases, resulting in the belt rotating up toward the outer diameter of the drive clutch sheaves and downward into the sheaves of the driven clutch. This action, which increases the driven clutch speed, is called upshifting.

Should the throttle setting remain the same and the vehicle is subjected to a heavier load, the torque sensing driven clutch will close, forcing the drive belt back up toward the outer diameter of the driven clutch. This also forces the belt downward into the sheaves of the drive clutch. This action, which decreases the driven clutch speed, is called backshifting.

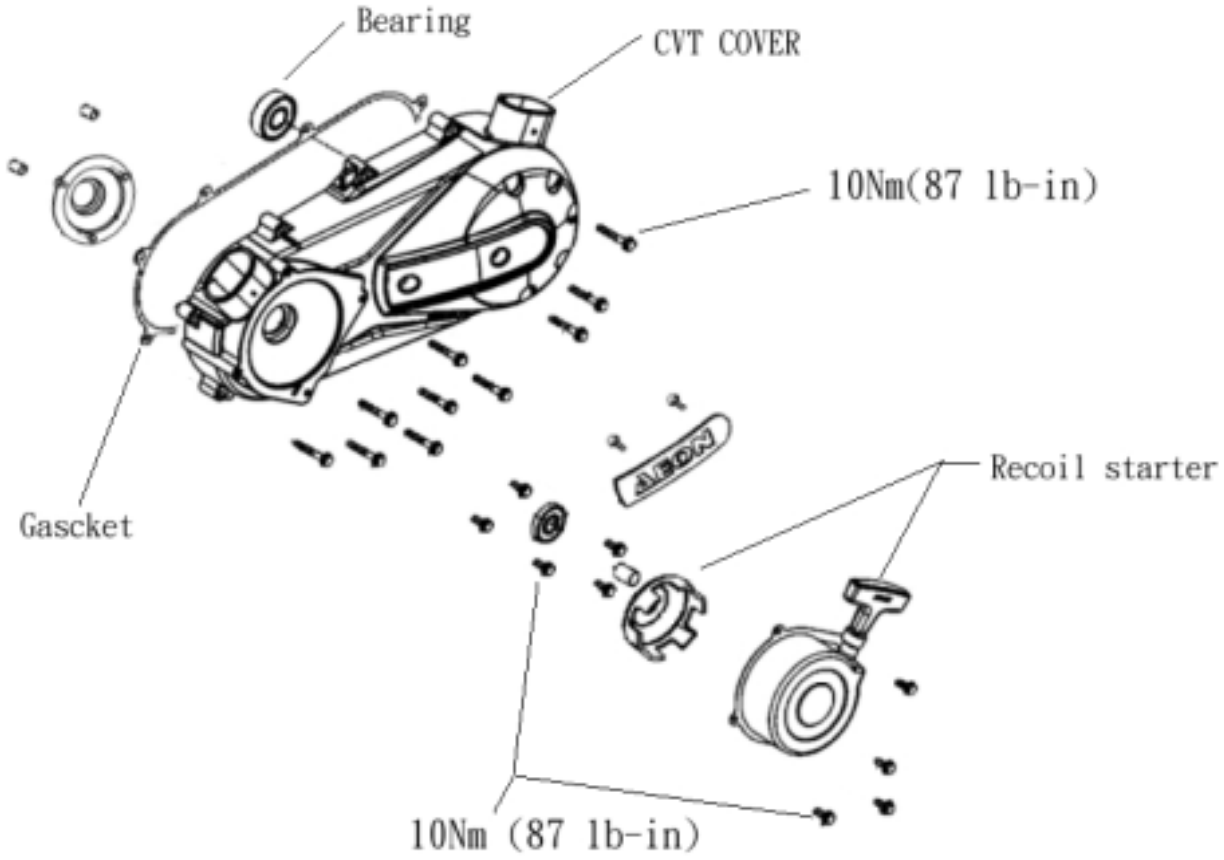
In situations where loads vary and throttle settings are constant, the drive and driven clutches are continually shifting to maintain optimum engine RPM. At full throttle a perfectly matched CVT system should hold engine RPM at the peak of the power curve. This RPM should be maintained during clutch upshift and backshift. In this respect, the CVT system is similar to a power governor. Rather than vary throttle position, as a conventional governor does, the CVT system changes engine load requirements by either upshifting or backshifting.

CVT System Drying

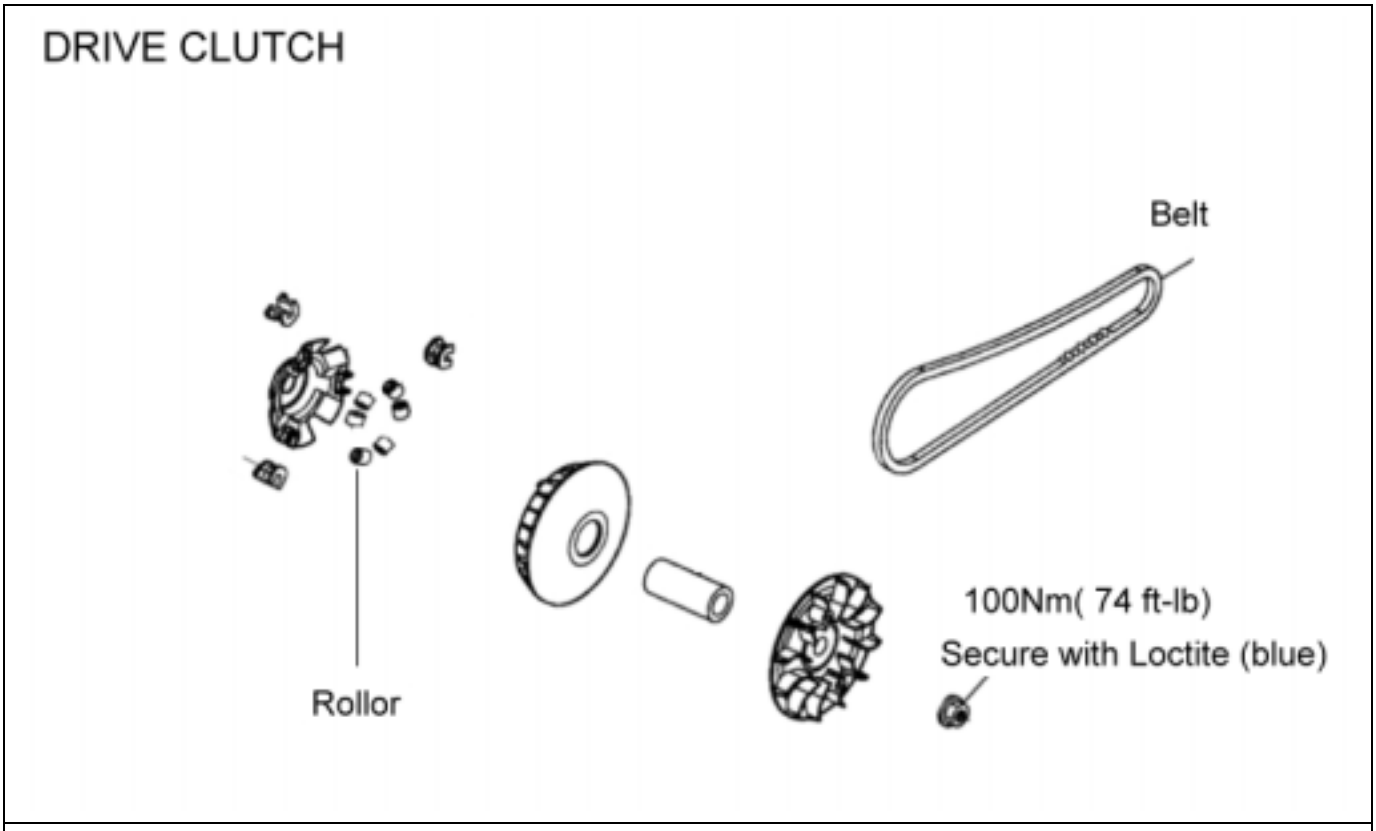
NOTE: If operating the ATV through water, be sure to check the CVT cover and other ATV components for water ingestion. The ATV should be checked immediately. Refer to Owner's Manual for Safe Riding Tips.

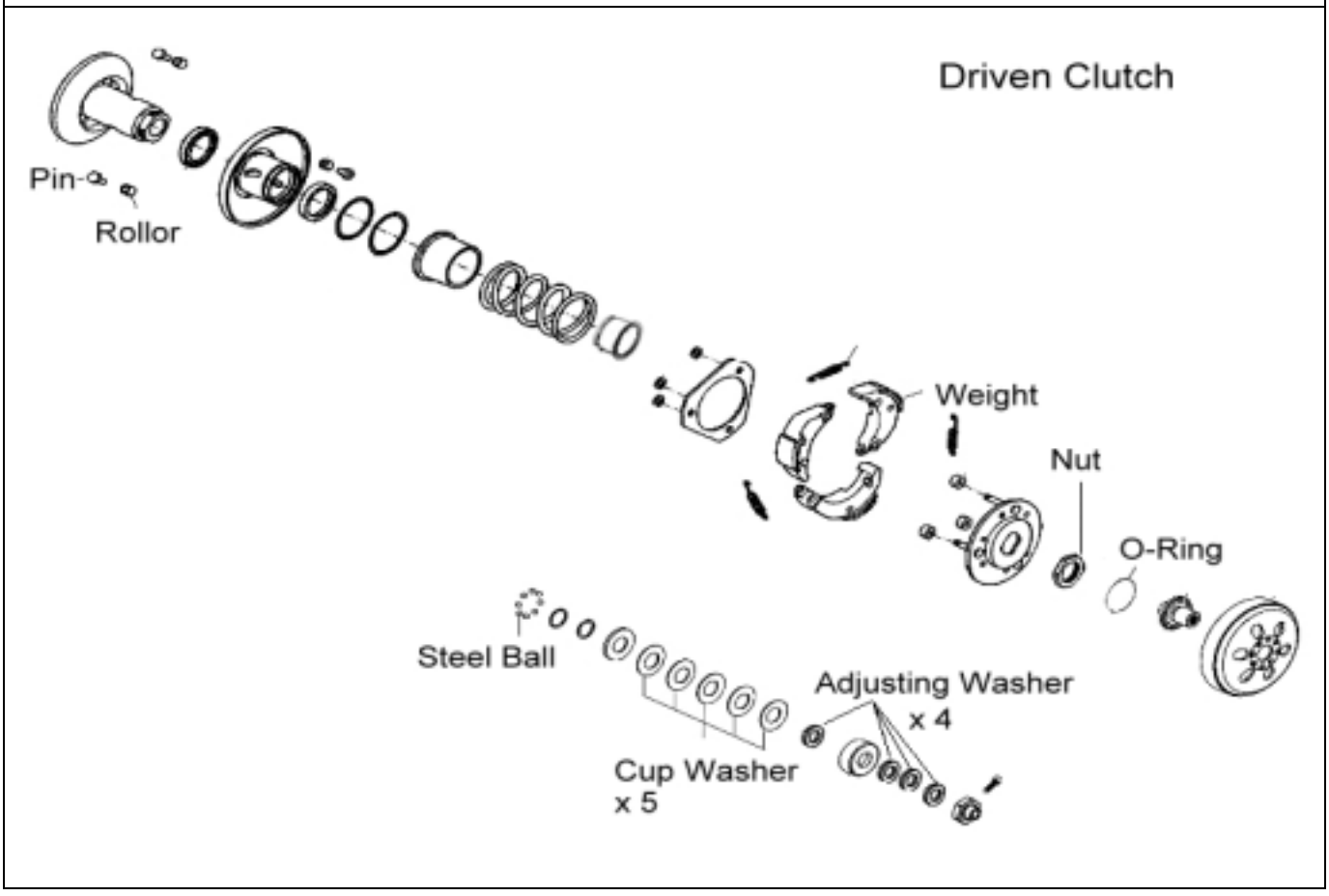
1. To drain any water that may be trapped inside the CVT area, remove the CVT drain plug and O-ring located on the bottom of the crankcase and let the water drain out. The CVT drain plug is shown at right.
2. To further expel water from the CVT area cover and to dry out the CVT system, shift the transmission to neutral and rev the engine slightly to expel the moisture. This will also air-dry the belt and clutches.
3. Allow engine RPM to settle to idle speed, shift transmission to lowest available range and test for belt slippage. Repeat as needed.

CLUTCH COVER/ RE-COIL STARTER EXPLODED VIEW



CVT EXPLODED VIEW





CVT OVERHEATING/DIAGNOSIS

During routinemaintenance or whenever CVT system overheating is evident, it's important to check the inlet *and* outlet ducting for obstructions. Obstructions to air flow through the ducts will significantly increase CVT system operating temperatures. The ATV should be operated in LOW RANGE (if equipped) when pulling or plowing heavy loads, or if extended low speed operation is anticipated.

GENERAL RANGE OPERATION GUIDELINES:	**Low Range (if equipped)**: Heavy pulling, basic operational speeds less than 10Km, riding through rough terrain (swamps, mountains, etc.), low ground speeds.
	High Range: High ground speeds, speeds above 10Km.
Diagnosis of Clutch Drive Belt & Cover Related Issues:	
Possible Causes	**Solutions/What to do**
Loading the ATV into a pickup or tall trailer when in high range.	Shift transmission to low range (if equipped) during loading of the ATV to prevent belt burning.
Starting out going up a steep incline.	When starting out on an incline, use low range (if equipped), or dismount the ATV after first applying the park brake and perform the "K" turn.
Driving at low RPM or low ground speed (at approximately 3--7 MPH).	Drive at higher speed or use Low Range. (if equipped) The use of Low Range is highly recommended for cooler CVT operating temperatures and longer component life.
Insufficient warm--up of ATVs exposed to low ambient temperatures.	Warm engine at least 5 min., then with transmission in neutral, advance throttle to approx. 1/8 throttle in short bursts, 5 to 7 times. The belt will become more flexible and prevent belt burning.
Slow and easy clutch engagement.	Fast, effective use of the throttle for efficient engagement. Continuous operation at the point of engagement (initial vehicle movement) increases CVT temperatures and component wear.
Towing/Pushing at low RPM/low ground speed.	Use Low Range only. (if equipped)
Plowing snow, dirt, etc./utility use.	Use Low Range only. (if equipped)
Stuck in mud or snow.	Shift the transmission to Low Range (if equipped), carefully use fast, aggressive throttle application to engage clutch. **Warning: Excessive throttle may cause loss of control and vehicle overturn.**
Climbing over large objects from a stopped position.	Shift the transmission to Low Range (if equipped), carefully use fast, aggressive, throttle application to engage clutch. **Warning: Excessive throttle may cause loss of control and vehicle overturn.**
Belt slippage from water or snow ingestion into the CVT system.	Shift the transmission to neutral. Using the throttle, vary the engine rpm from idle to **3/4 throttle**. Engage transmission in the lowest possible range (if equipped) and test for belt slippage. Repeat several times as required. **During this procedure, the throttle should not be held at the full position**. CVT seals should be inspected for damage if repeated leaking occurs.
Clutch malfunction.	Inspection/repair of clutch components should be performed by a certified Goes MSD techinician.

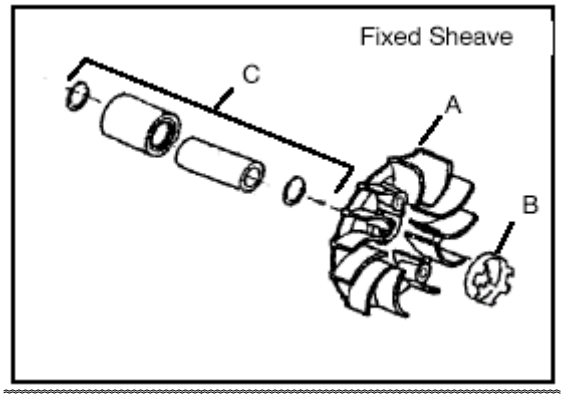
4. Remove the entire re-coil starter bolt.
5. Remove the lock nut, washer, and the re-coil start pawl from the crankshaft.

Clutch Cover Removal

1. Remove the left foot rest.
2. Loosen the duct clamps and slide ducts upward off cover.

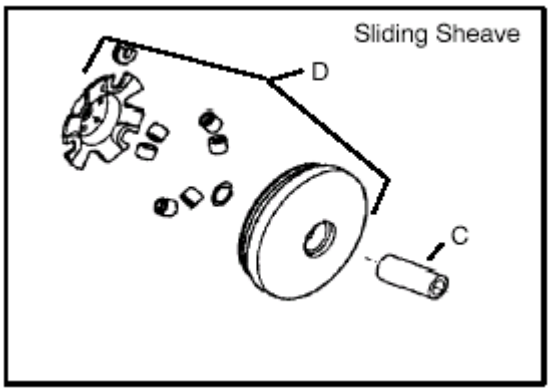
3. Remove all screws and cover with re-coil start attached.

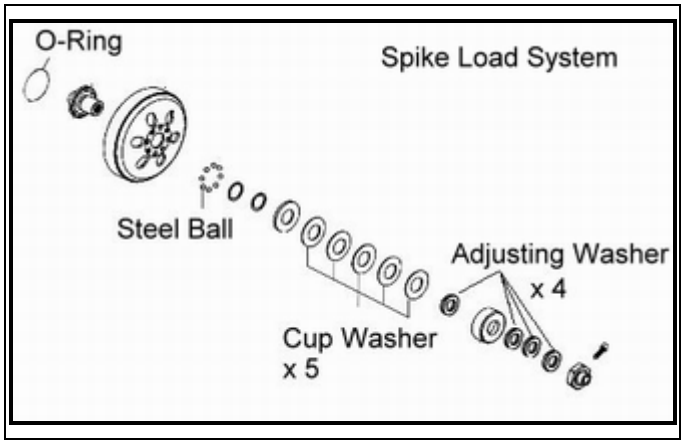
6. Remove all screws from CVT case and case.



7. Use two hands to hold the cam plate and the primary sliding sheave together when removing the primary sliding sheave and the cam plate assembly.
This prevents the roller weights from falling out of the assembly.

8. Remove the primary sliding sheave and cam plate assembly (D) as one assembly.





CAUTION

The re-coil starter bolts must with loctite when recombination.

Spike load system Removal

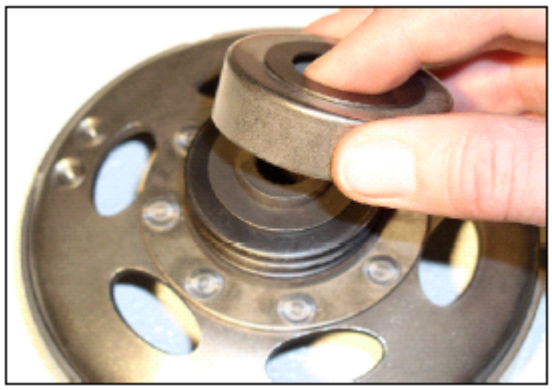
NOTE: *This assembly utilizes a torque limiting system to prevent transmission damage. Use care removing the clutch assembly, as the torque—limiting components become free and could fall apart. Mark or note parts during disassembly.*

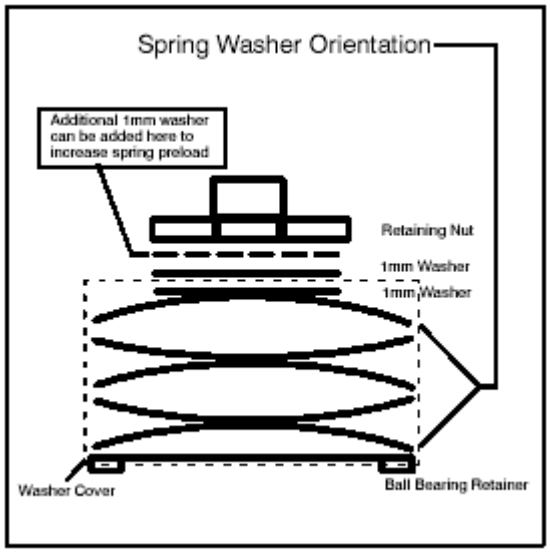
1. Remove the driven clutch assembly by releasing the set screw and removing the nut from the shaft.

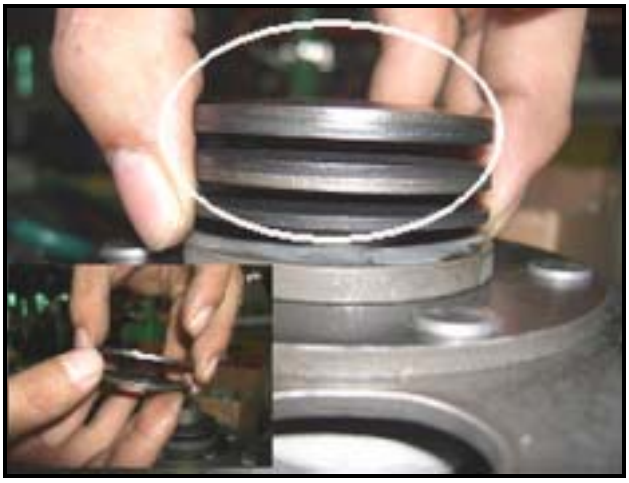
2. Remove the nut by pincer and air wrench.

3. Pull the entire clutch off as an assembly.

2. Set the driven clutch assembly on a flat surface. Remove the cover, spring washer stack, and ball bearing retainer. Inspect components for excessive wear or damage. Replace components as required.





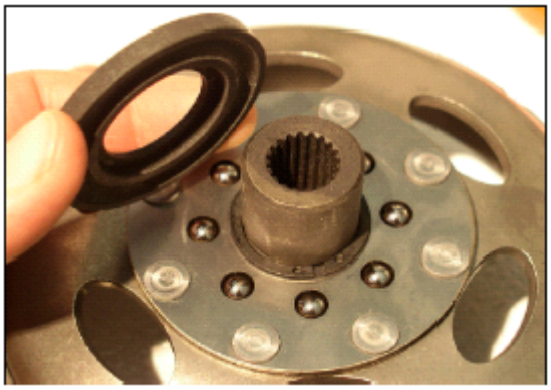


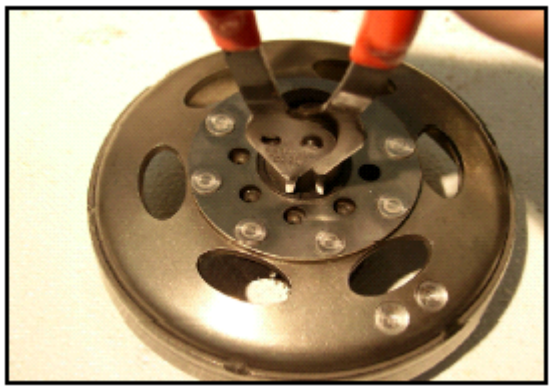
CAUTION

Spring Washer Orientation:

Additional 1mm washer can be added here to increase spring preload

3. Remove the ball bearings. Use a snap--ring pliers to remove the retainer on the hold cam. Remove the washer. Inspect the hold cam for excessive spline wear or damage. Replace the component if required.

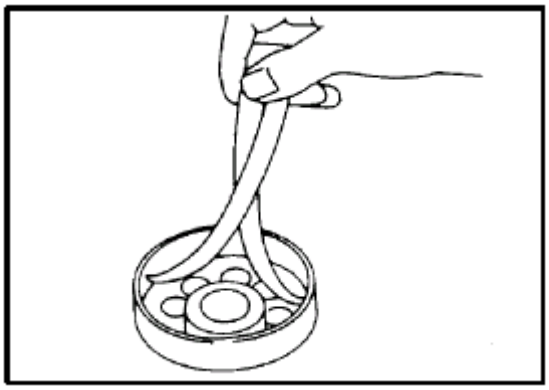




DRIVEN CLUTCH SERVICE

Driven Clutch Disassembly and Inspection

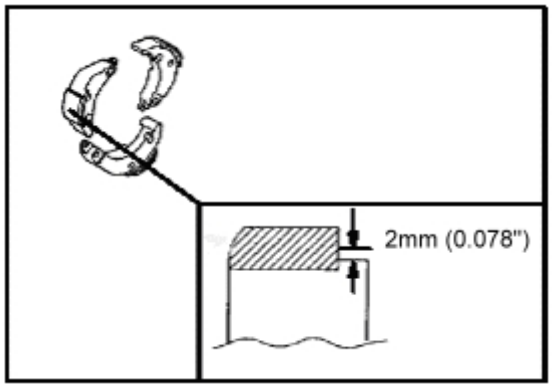
4. Inspect the condition of the clutch drum. Measure the inside diameter of the cover at 90 degree intervals using a caliper. Inspect the condition and diameter of the drum lining. If either the measurements or the lining indicates excessive wear, replace the clutch cover.



⚠ CAUTION

Spring pressure can cause components to eject suddenly. Use care during removal.

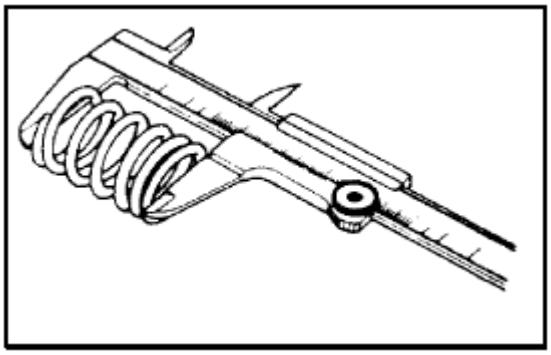
5. Inspect the condition of the clutch drum. Measure the inside diameter of the cover at 90 degree intervals using a caliper. Inspect the condition and diameter of the drum lining. If either the measurements or the lining indicates excessive wear, replace the clutch cover.



Driven Clutch Friction Pad
Service Limit: 2 mm (0.078")
Driven Clutch Hub I. D.
Service Limit: 153 + 0.2 mm

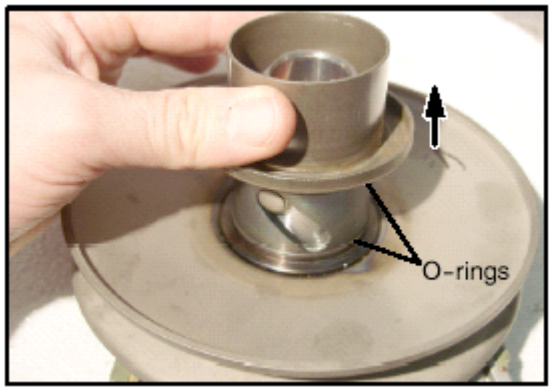
6. Secure the assembly in a clamping device. To access the driven spring, mark and remove the outer sheave retaining nut. Remove the friction pad assembly and driven spring.

7. Use a caliper to check the length of the compression spring. At full extension, the measurement should be no less than 130 mm. If out of specification, replace the spring.

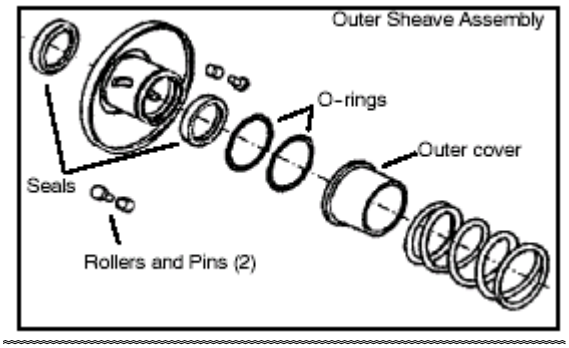


Driven Compression Spring
Service Limit:
130 mm (51.2")

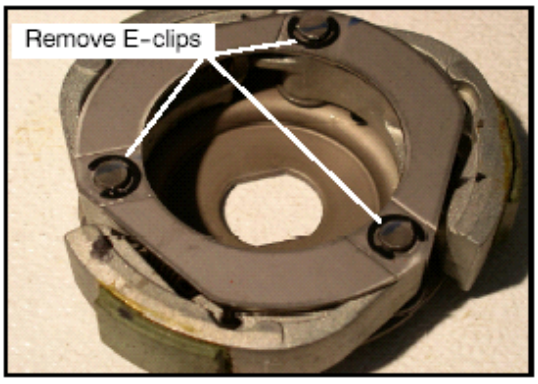
8. Remove the outer roller pin cover by turning and pulling up on the cover. Replace the 2 o--rings.



9. Remove the rollers and pins using a needle—nose pliers and inspect all components. Replace if any damage or excess wear is found. Replace the o--rings and seals anytime the driven is apart.

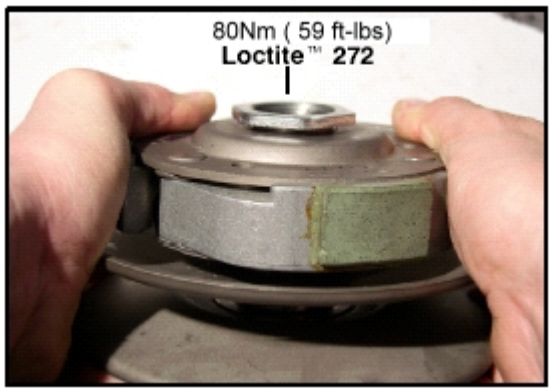


10. To replace the friction shoes, remove the e—clips that retain the backing plate. Use a suitable tool to remove and install the springs connecting the shoes, using care not to over--stretch the springs more than is necessary.



11. To reassemble the driven assembly, reverse the disassembly procedures. Fill the outer sheave cavity with fresh grease and slide onto the inner sheave shaft. Align and insert the (2) roller/pin assemblies. Install new o--rings and the outer roller pin cover. Place the washer onto the threaded shaft and apply Loctite 272 to the threads.

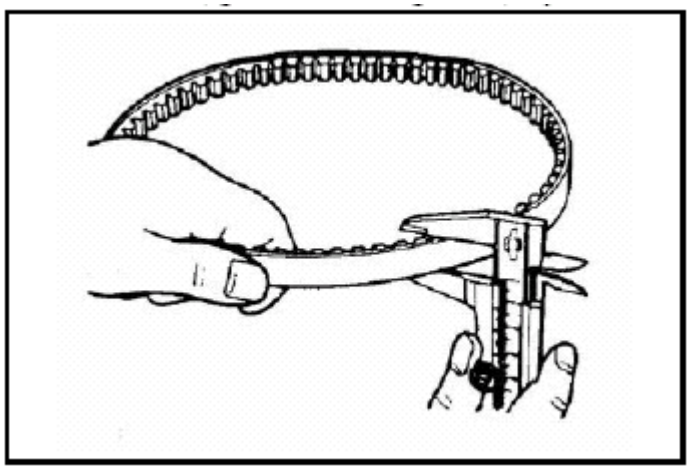
12. *Have an assistant available for final assembly.* Install the compression spring. Place the friction pad assembly over the spring and compress the driven assembly together with both hands. With the assembly compressed and the threads exposed, have an assistant thread a new retaining nut onto the shaft. Secure the assembly in a clamping device and torque the retaining nut to **80 Nm**.



NOTE: Outer sheave retaining nut replacement is strongly recommended. Use Loctite 272 on the threads during reassembly.

CVT BELT INSPECTION

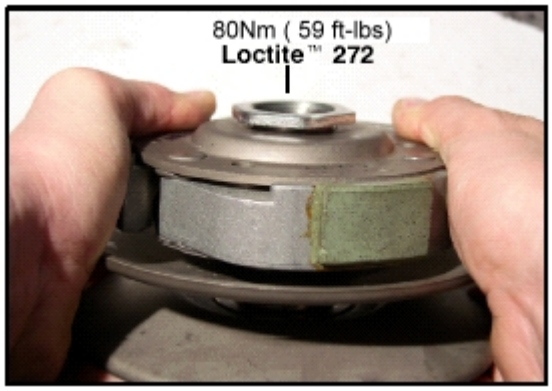
1. Inspect the surface of the drive belt for uneven wear or grease deposits. Using a caliper, measure the width of the belt. The service limit of the belt is **24 mm**. If the width of the belt is less than the service limit, or if the belt is worn, glazed or hour--glassed, replace.



CVT Drive Belt Width Service Limit:24mm

Driven Clutch Assembly

1. Insert new seals into the outer sheave assembly. Fill the outer sheave cavity with fresh grease and slide onto the inner sheave shaft. Align and insert the roller/pin assemblies. Install new o-rings and the outer roller pin cover. Place the washer onto the threaded shaft and apply Loctite 272 to the threads.



2. *Have an assistant available for final assembly*. Install the compression spring. Place the friction pad assembly over the spring and compress the driven assembly together with both hands. With the assembly compressed and the threads exposed, have an assistant thread a new assembly nut onto the shaft. Secure the assembly in a clamping device and torque the assembly nut to specification.

Driven Assembly Nut Torque
80 Nm (59 ft. lbs.)

3. Install the drive belt on driven clutch and move belt as far into the sheaves as possible.
4. Loop the belt over the drive clutch and install driven clutch on transmission shaft.
5. Install driven clutch hub, then the retaining nut and O-ring. Torque retaining nut to specification.

Driven Clutch Nut Torque:
90-110 Nm (66-80 ft.lbs.)
Set Screw: Loctite 272

DRIVE CLUTCH SERVICE

Drive Clutch Disassembly and Inspection

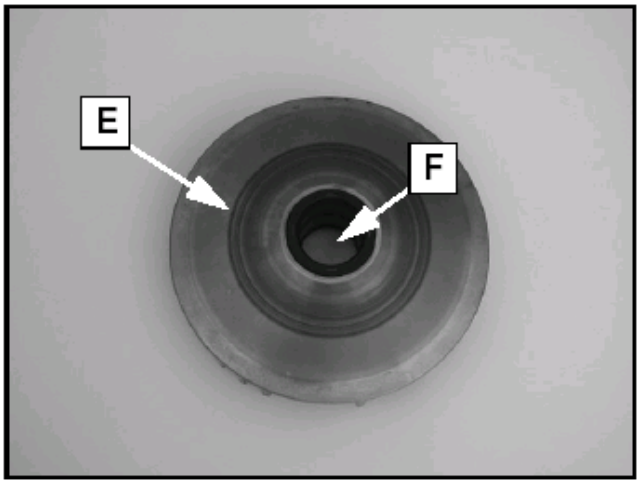
1. Remove outer drive clutch sheave and drive belt. Note parts assembly order.
2. Slide sheave and cam plate off crankshaft as an assembly.

NOTE: When removing primary sliding sheave and cam plate assembly, hold cam plate and sliding sheave together. This prevents the rollers from falling out of the assembly.

3. Remove cam plate.
4. Inspect surface of sleeve for wear, pitting, or damage.

5. Inspect cam plate for wear on surface (B) and splines (C). Replace cover guides (D) as a set.

6. Inspect sheave faces (E) for grooves or wear. Check bushings (F) and seals in the moveable sheave. The sleeve should be a close, smooth fit in the bushings and seals should fit tightly on the sleeve.



7. Remove and inspect each roller. Replace as a set if any have flat spots or if worn (they should be cylindrical).

8. Inspect the roller tracks (G) and both sides of the cam plate tabs (H) for wear.

Drive Clutch Assembly

1. Apply a very light film of grease to the seal lips and drive clutch sleeve. Then install the sleeve.

2. Install all rollers with open end facing inward toward divider (A) (the side with inner bushing visible.)

3. Install the cam plate.

4. Install the bushing, primary sliding sheave and cam plate assembly.

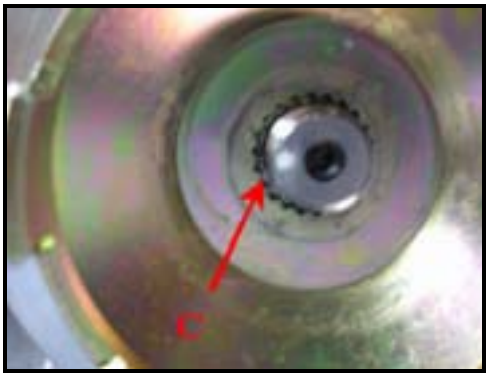
NOTE: When installing the primary sliding sheave and the cam plate assembly, hold the assembly together to prevent the rollers from dislodging.

5. Open the sheaves of the secondary clutch and push the belt down between the sheaves.

6. Install the driven clutch on the transmission input shaft, looping the belt onto the drive clutch sleeve as shown.

7. Pinch the belt in the middle and install the outer drive clutch sheave as far as possible. Hold outer sheave in place.

8. Install the claw washer, engaging the inner spline of the washer on the crankshaft and the outer claws in the sheave.



9. Install the kick start drive hub, making sure the inner splines (C) are engaged on the crankshaft.

10. Install flat washer and nut and torque to specification.

Drive Clutch Lock Nut Torque:
100 Nm (74ft-lbs)

CHAPTER 4

ENGINE

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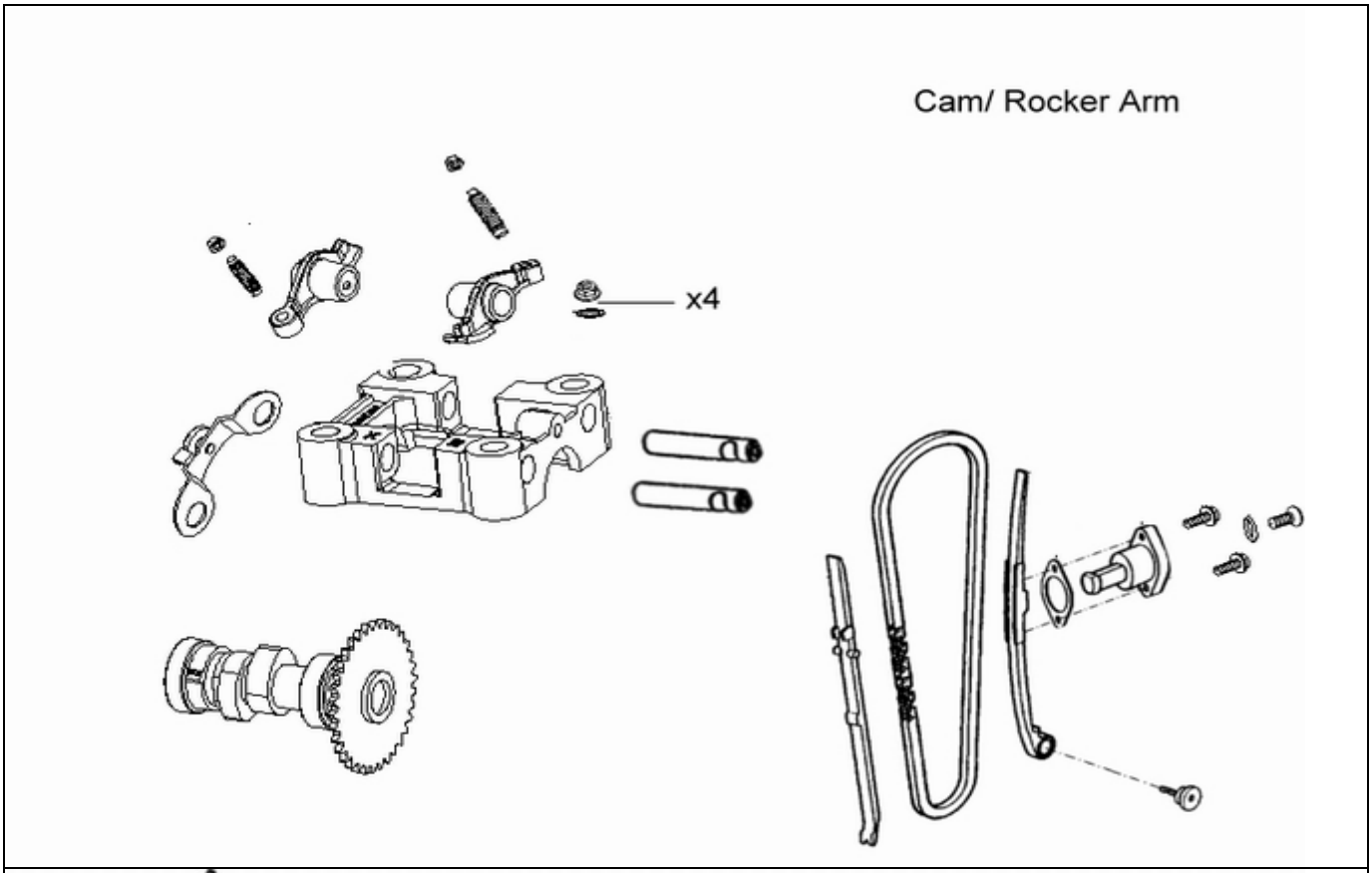
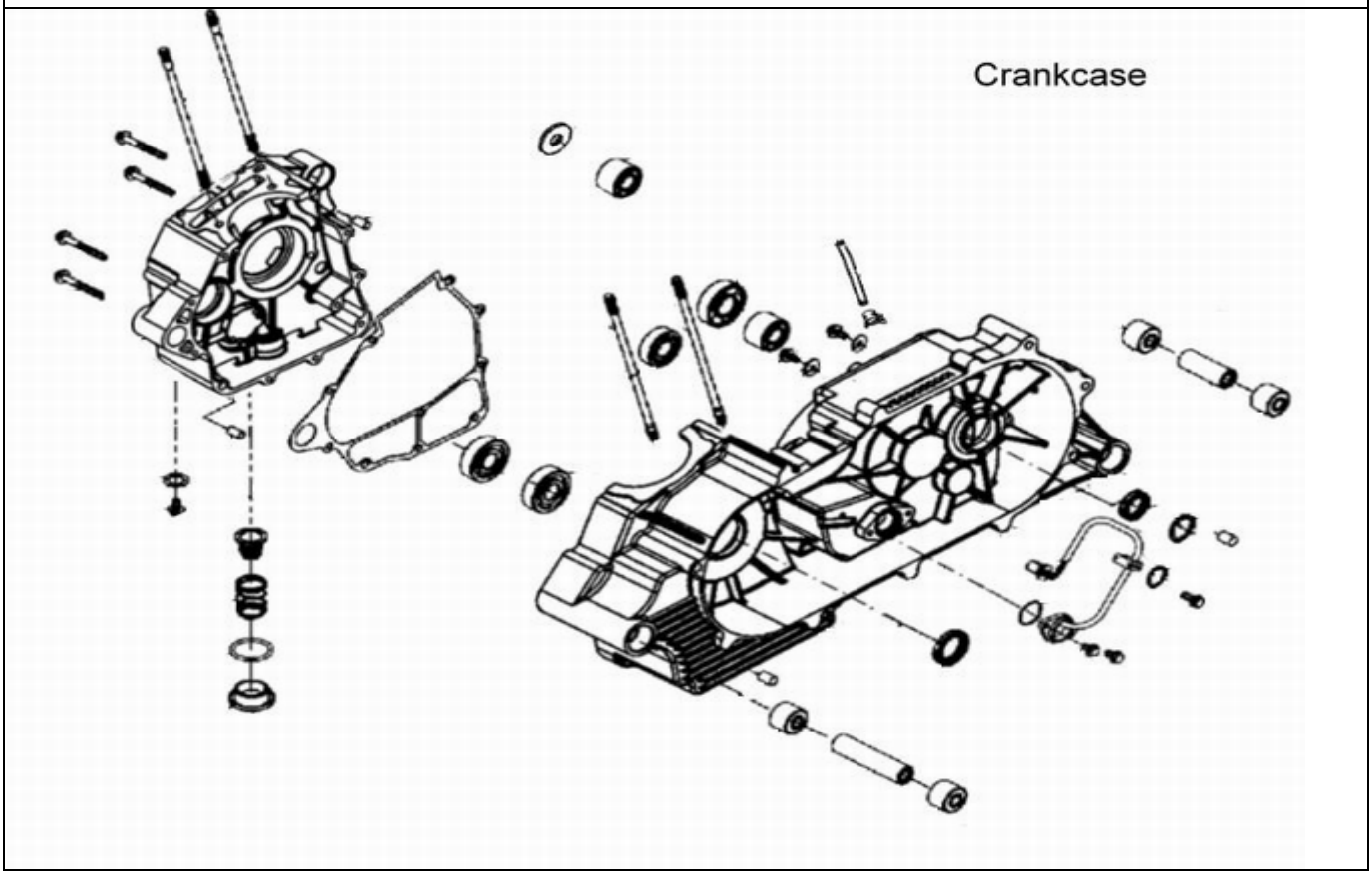
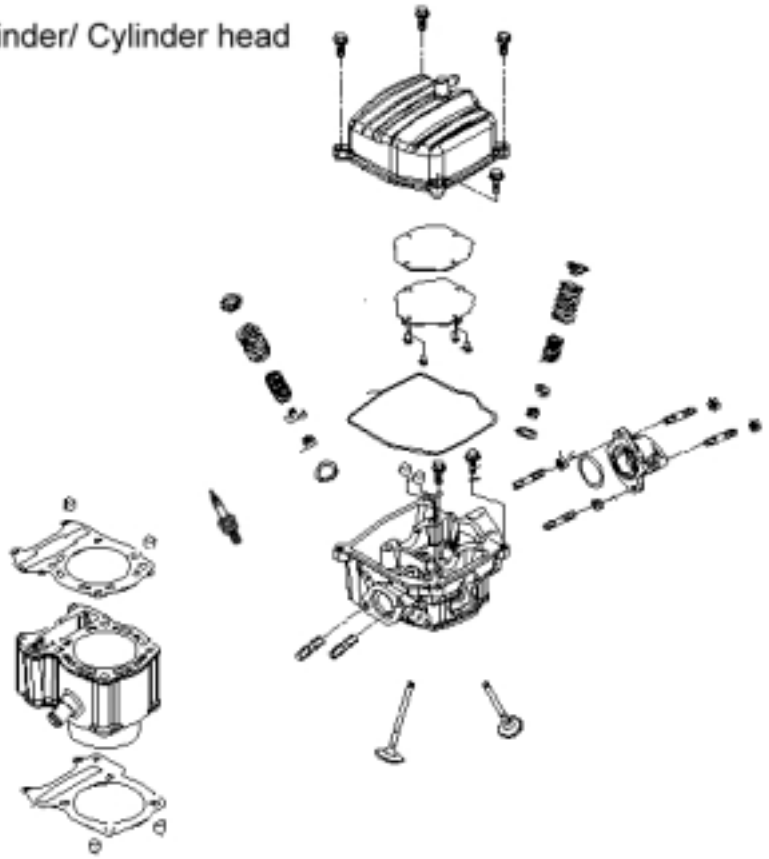
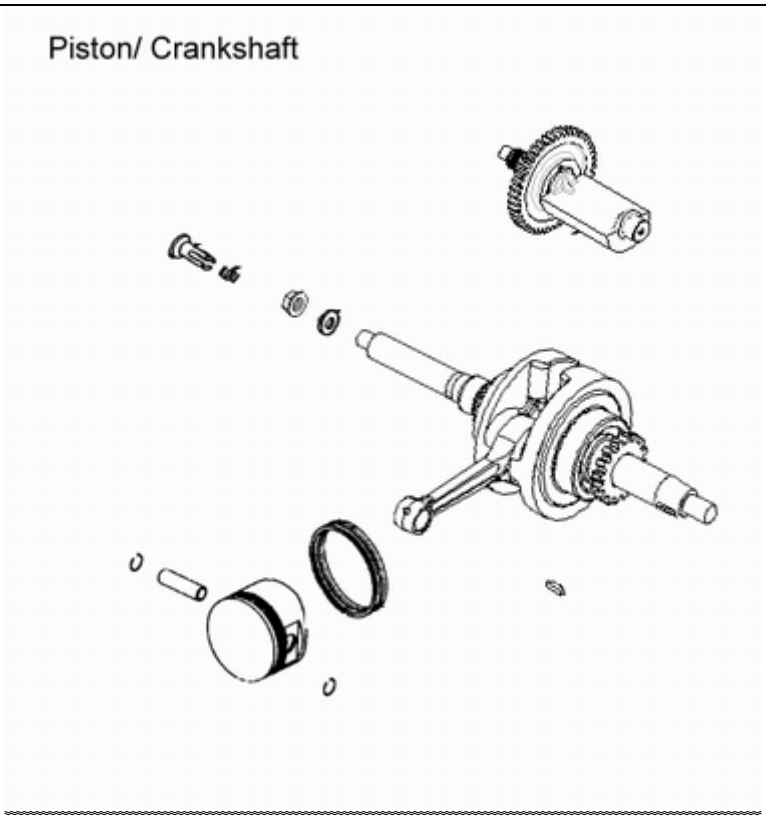




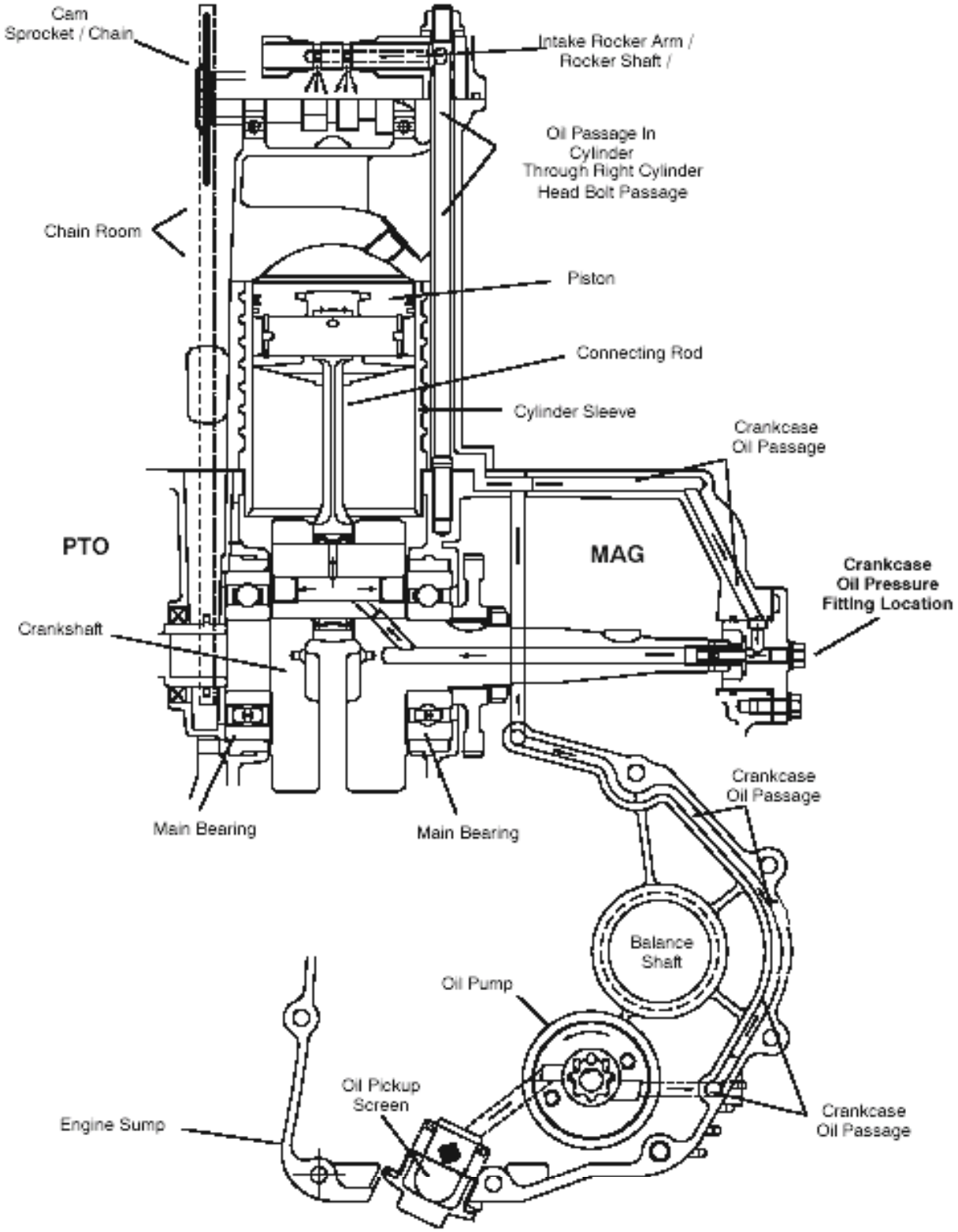
Clylinder/ Cylinder head



Piston/ Crankshaft



OIL FLOW DIAGRAM



PISTON IDENTIFICATION

The piston have an identification mark for piston placement.

Note the directional and identification marks when viewing the pistons from the top. The letters “IN” must always be toward the intake side of the engine.

The other numbers are used for identification as to diameter, length and design. Four stroke engine rings are rectangular profile. The numbers or letters on all rings (except oil control rings) must be positioned upward. See text for oil control ring upper rail installation. Use the information below to identify pistons and rings.

ACCESSIBLE COMPONENTS

The following components can be serviced or removed with the engine installed in the frame:

1. Flywheel
2. Alternator/Stator
3. Starter Motor/Starter Drive
4. Oil pump
5. Rocker Arms
6. Carburetor
7. Transmission

The following components require engine removal for service:

1. Cam Chain and Sprockets
2. Cylinder Head
3. Cylinder
4. Piston/RIngs
5. Camshaft
6. Crankshaft
7. Crankshaft Main Bearings
8. Crankcase
9. Transmission
10. Valves

NOTE: Cam chain service requires crankshaft removal, as the chain is located on the pto side of the engine.

NOTE: Crankshaft components are not serviceable. Replace crankshaft as an assembly.

ENGINE REMOVAL

1. Clean work area.
2. Thoroughly clean the ATV engine and chassis.
3. Disconnect battery cables.
4. Drain engine oil.
5. Drain radiator water.
6. Disconnect spark plug high tension lead.
7. Disconnect all electrical wires from the engine.
8. Disconnect radiator tubes.
9. Remove the following parts as required.

◎ Seat
◎ Left and Right Side Covers
◎ Fuel Tank Cover / Front Cab
◎ Fuel Tank

10. Remove exhaust pipe.
11. Remove airbox.
12. Remove carburetor. Insert a clean shop towel into the carburetor flange to prevent dirt from entering the intake port.
13. Starter motor. Note ground cable location. Mark positive (+) cable mounting angle and remove cable.
14. Remove transmission link rod(s) from gear selector and secure out of the way.
15. Remove engine to chassis ground cable.
16. Refer to Chapter 5 to remove the swing arm and drive shaft assemblies.
17. Remove all engine mount nuts and / or engine mount plates.
18. Remove engine through left side of frame.

Front engine mount, left hand

Front engine mount, right hand

Rear engine mount

ENGINE INSTALLATION NOTES

After the engine is installed in the frame, review this checklist and perform all steps that apply.

General Items

◎ Install previously removed components using new gaskets, seals, and fasteners where applicable.

◎ Perform regular checks on fluid levels, controls, and all important areas on the vehicle as outlined in the daily pre-ride inspection checklist (refer to Chapter 2).

CVT System

◎ Clean clutch sheaves thoroughly and inspect inlet and outlet ducts for proper routing and sealing.

◎ Inspect clutch rollers, shoes and springs before reassembly.

Transmission

◎ Inspect transmission operation and adjust linkage if necessary.

Exhaust

◎ Replace exhaust gaskets. Seal connections if desired with high temp sealant.

◎ After running the engine, verify all bolted exhaust connections are tight and in good condition.

Engine Mount Torque

◎ Front Mount – 80Nm

◎ Rear Mounts –80Nm

Engine Break In Period

4 Cycle Engine Break-In Period is defined as the first 10 hours of engine operation or 2 full tanks of fuel.

◎ Use only All Season Synthetic Oil, or API certified "SH" oil.

◎ Use fuel with a minimum octane of 87 (R+M)/2 method.

◎ Change break-in oil and filter at 20 hours or 100 miles, whichever comes first.

Radiator System

◎ Use only 50% coolant water(50% Ethylene Glycol and 50% water) in radiator, do not fill only water.

ENGINE LUBRICATION

Oil Type 0--40W Synthetic oil.
Capacity Approximately 1800 cc
Drain Plug/ Screen Fitting 20 Nm . . . . . .
Oil Pressure Specification: Continuous oil flow out of stator housing plug hole at Idle RPM. 0W--40 Synthetic

OIL FLOW TEST

⚠ WARNING

Oil temperature can cause serious injury and damage. Wear the proper safety gear when performing these procedures.

NOTE: *Due to the engine assembly having amajority of roller bearings, oil pressure readings hot or cold will be very low. Low oil pressure is not an indication of a oil delivery problem.*

1. Remove center plug from the stator housing on the crankcase.
2. Insert a M6x8--1.00 oil pressure gauge adaptor into the crankcase and attach a low pressure gauge (0--10psi / 0--70kpa).
3. Start engine and allow it to reach operating temperature while monitoring gauge indicator.
Any pressure above zero is an indication of good oil flow.

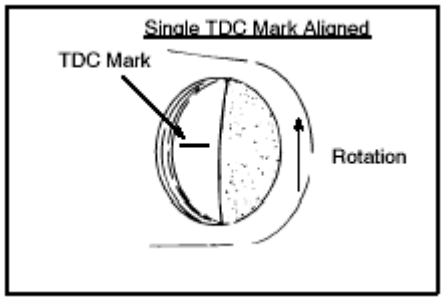
TOP-END DISASSEMBLY

CAM CHAIN TENSIONER REMOVAL

1. Remove oil fill cap from the stator housing and valve cover.

To position crankshaft at Top Dead Center (TDC) on compression stroke:

2. Rotate engine slowly in the direction of rotation watching intake valves open and start to close.
3. Continue to rotate engine slowly while watching camshaft sprocket marks and the mark in the timing inspection hole.



4. Align single (TDC) mark on flywheel with in the inspection hole, and the cam sprocket pin (facing upward) aligned with the camshaft to crankshaft center line.

NOTE: The sprocket marks align with gasket surface, the cam lobes should be pointing down and the valves should have clearance at this point.

5. Remove the two cam chain tensioner flange bolts.

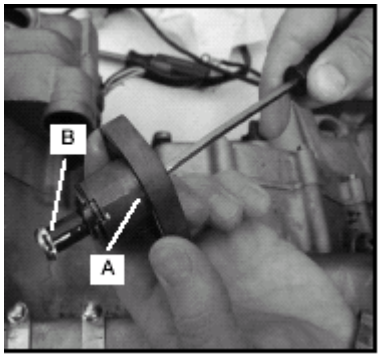
CAUTION

The plunger is under spring tension.
Maintain inward pressure while removing.

2. Using a small flat blade screwdriver, turn the tensioner clockwise to retract the plunger. The plunger should move smoothly in and out of the tensioner body.
3. Replace entire tensioner assembly if any part is worn or damaged.

CAM CHAIN TENSIONER INSPECTION

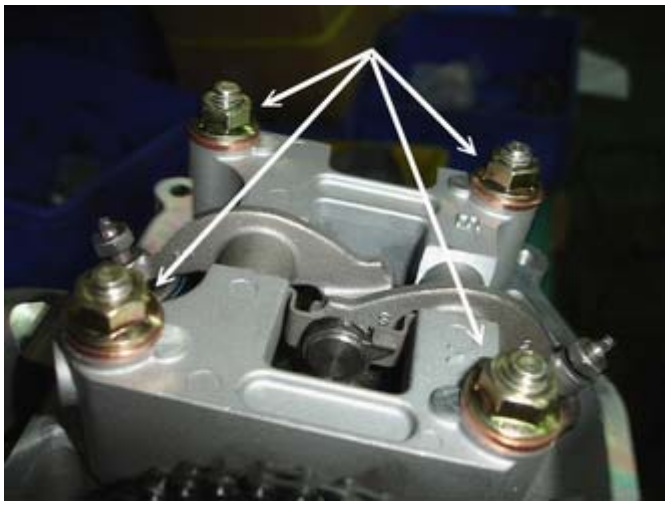
1. Allow cam chain tensioner plunger to extend outward to the end of its travel. Inspect tensioner (A) and plunger (B) for wear or damage.



ROCKER ARM/SHAFT DISASSEMBLY AND INSPECTION

NOTE: Orientation of the components is important for reassembly. Mark all components before disassembly.

1. Loosen each of the four cylinder head bolts evenly 1/4 turn each time in a cross pattern until loose.

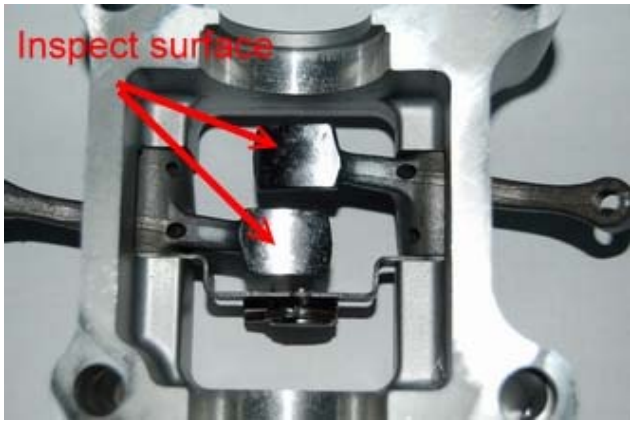


2. Remove bolts and tap the cam support tower with a plastic hammer until loose.

3. Remove the rocker shaft locking plate.

4. Mark or tag rocker arms and shafts to keep them in order for assembly.

5. Inspect each rocker arm cam follower surface. If there is any damage or uneven wear, replace the rocker arm.
NOTE: Always inspect camshaft lobe if rocker arms are worn or damaged.



6. Remove each rocker arm shaft using the 10 mm hex bolt that secures the lock plate.
NOTE: Placing the hex bolt in a vise and lightly tapping the rocker assembly with a non--marring hammer may be required to pull stuck rocker arm shafts.

7. Measure O.D. of rocker shafts for out--of --round. Inspect them for wear or damage. Replace if excessive wear is evident.

NOTE: Orientation of the rocker shafts is important for reassembly. Place only the exhaust rocker shaft into the exhaust side of the cam support.

8. Measure I.D. of each rocker arm for out-of—round and visually inspect the I.D. surface. Replace arm if excessive wear is evident.

Rock Arm ID: 10.10mm
Rocker Arm OD: 9.91mm

9. Inspect rocker adjuster screws for wear, pitting, or damage to threads of the adjuster or locknut. Replace all worn or damaged parts.

NOTE: The end of the adjuster is hardened and cannot be ground or re-faced.

CAMSHAFT REMOVAL AND INSPECTION

NOTE: Cam chain tensioner must be removed before performing this procedure.

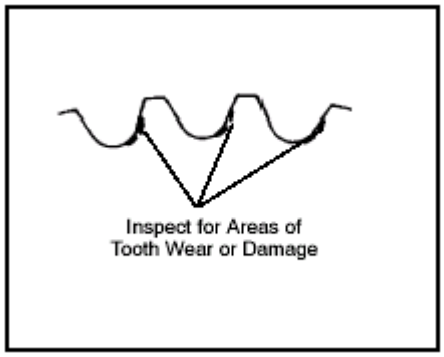
1. Remove the 4 cylinder head bolts evenly by loosening each one 1/4 turn at a time until loose.

Tap the rocker assembly with a non—marring hammer to loosen the assembly.

2. Remove the cam chain from the sprocket by tilting the cam assembly and simultaneously lifting the chain.

3. If not removing the cylinder for other service, secure the cam chain with a wire to prevent it from falling into the crankcase.

4. Inspect cam sprocket teeth for wear or damage. Replace if necessary.



Cam Lobe Height
Intake
Std: 35.16 mm
Limit: 35.11 mm
Exhaust
Std: 35.05 mm
Limit: 35.00 mm

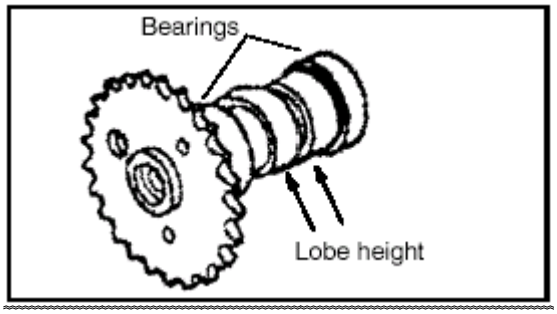
2. Thoroughly clean the cam shaft

3. Measure height of each cam lobe using a micrometer. Replace cam if worn below minimum height.

Replace camshaft if damaged or if any part is worn excessively.

CAMSHAFT INSPECTION

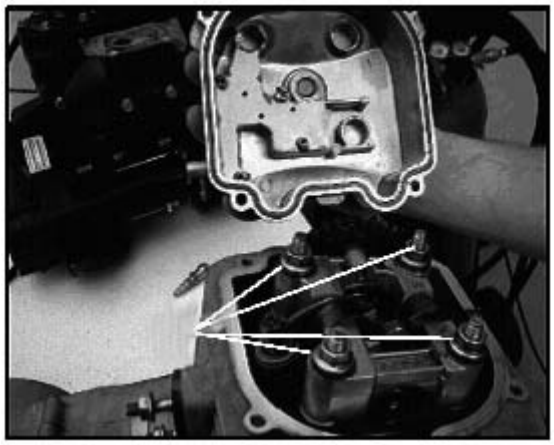
1. Visually inspect each cam lobe and bearing for wear, chafing or damage.



CYLINDER HEAD REMOVAL

NOTE: Cam chain and tensioner must be removed.
If no crankshaft service is being performed, secure cam chain with mechanics wire to avoid chain drop into the crankcase.

1. Loosen each of the four cylinder head bolts evenly 1/4 turn each time in a cross pattern until loose.



2. Remove the cylinder bolts and tap the cam support tower with a plastic hammer until loose. Remove.

3. After removing the the camshaft and securing the cam chain, tap cylinder head lightly with a plastic hammer until loose.

CAUTION
Tap only in reinforced areas or on thick parts of cylinder head casting to avoid damaging casting.

4. Remove the thermostatic.

4. Remove intake manifold nuts.

5. Remove cylinder head and head gasket.

Cylinder Head Inspection

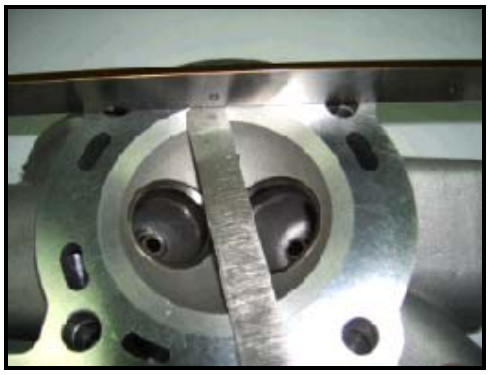
1. Thoroughly clean cylinder head surface to remove all traces of gasket material and carbon.

⚠ CAUTION

Use care not to damage sealing surface. If there is damage found on the cylinder head combustion chamber, it is recommended the component be replaced.

CYLINDER HEAD WARP INSPECTION

1. Lay a straight edge across the surface of the head at several different points and measure warp age by inserting a feeler gauge between the straight edge and the cylinder head surface. If warp age exceeds the service limit, replace the cylinder head.



Cylinder Head Warp Limit: 0.05mm

COMBUSTION CHAMBER INSPECTION

Clean all accumulated carbon deposits from combustion chamber and valve seat area with a soft wire brush. Inspect the combustion chamber for cracks and/or damage from foreign debris.

CYLINDER HEAD DISASSEMBLY

⚠ WARNING

Wear eye protection or a face shield during cylinder head disassembly and reassembly.

NOTE: Keep all parts in order with respect to their location in the cylinder head.

NOTE: Valves have inner and outer springs.

1. Using a valve spring compressor, compress the valve springs and remove the split keeper.

NOTE: To prevent loss of tension, do not compress the valve spring more than necessary.

2. Remove spring retainer and spring.

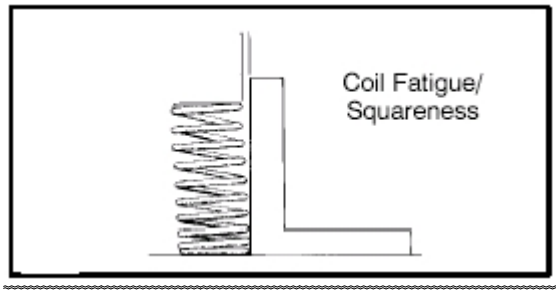
NOTE: The valve springs should be positioned with the tightly wound coils against the cylinder head on progressively wound springs.

3. Push valve out, keeping it in order for reassembly in the same guide.

4. Measure free length of the inner and outer springs with a caliper.

Valve Spring Free Length
Outer Spring Limit: 42.0mm
Inner Spring Limit: 31.3mm

5. Check spring for squareness as shown. Replace spring if measurements are out of specification.

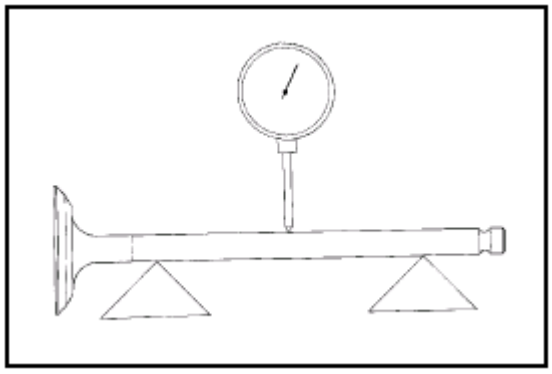


NOTE: Replace seals whenever the cylinder head is disassembled. Hardened, cracked or worn valve seals will cause excessive oil consumption and carbon buildup.

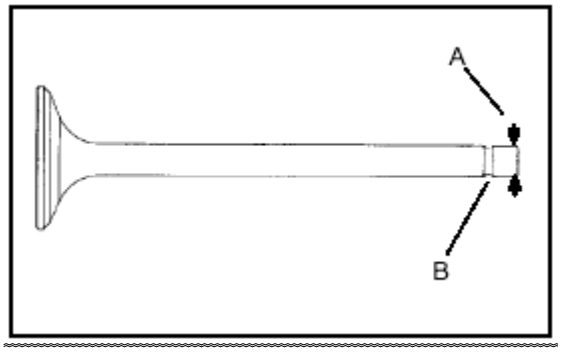
VALVE INSPECTION

1. Remove all carbon from valve with a soft wire wheel.

2. Check valve face for runout, pitting, and burnt spots. To check for bent valve stems, mount valve in a drill or use “V” blocks and a dial indicator.



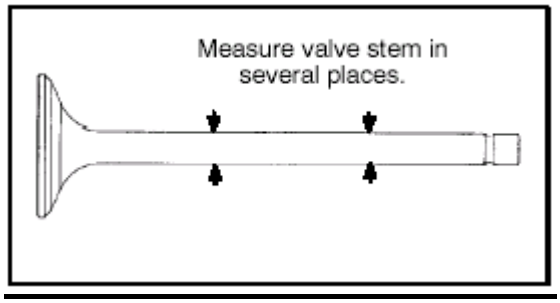
3. Check end of valve stem for flaring, pitting, wear or damage (A).



4. Inspect split keeper groove for wear or flaring of the keeper seat area (B).

NOTE: The valves cannot be re-faced or end ground. They must be replaced if worn, bent, or damaged.

5. Measure diameter of valve stem with a micrometer in three places and in two different directions (six measurements total). Replace if excessive wear is evident.



Valve Stem OD LIMIT:
Intake Valve Limit: 4.975mm
Exhaust Valve Limit: 4.955mm

6. Measure valve guide inside diameter at the top middle and end of the guide using a small hole gauge and a micrometer. Measure in two directions, front to back and side to side.

7. Subtract valve stem measurement to obtain stem to guide clearance.

NOTE: Be sure to measure each guide and valve combination individually.

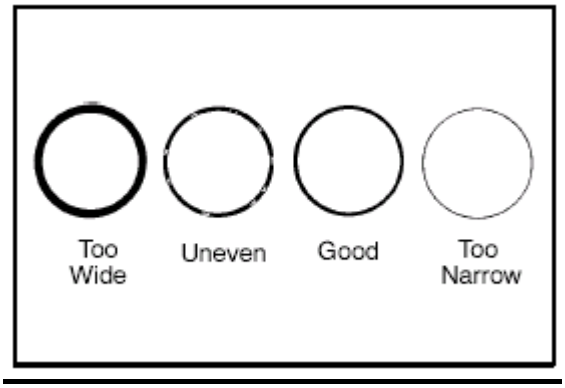
8. Replace valve and/or guide if clearance is excessive.

NOTE: If valve guides are replaced, valve seats must be reconditioned. Refer to Valve Seat Reconditioning for procedure.

VALVE SEAT RECONDITIONING

Valve Seat Inspection

Inspect valve seat in cylinder head for pitting, burnt spots, roughness, and uneven surface. If any of the above conditions exist, the valve seat must be reconditioned. *If the valve seat is cracked the cylinder head must be replaced.*



Cylinder Head Reconditioning

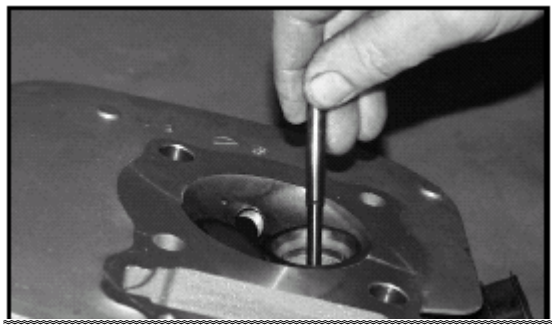
NOTE: Servicing the valve guides and valve seats requires special tools and a thorough knowledge of reconditioning techniques. Follow the instructions provided in the Valve Seat Reconditioning Kit.

⚠ CAUTION
Wear eye protection when performing cylinder head service. Valve guide replacement will require heating of the cylinder head. Wear gloves to prevent burns.

Follow the manufacturers instructions provided with the valve seat cutters in the Valve Seat Reconditioning Kit. Abrasive stone seat reconditioning equipment can also be used. Keep valves in order with their respective seat.

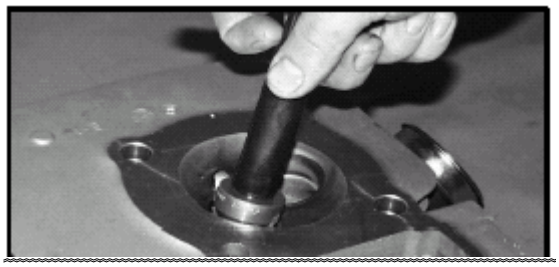
NOTE: Valve seat width and point of contact on the valve face is very important for proper sealing. The valve must contact the valve seat over the entire circumference of the seat, and the seat must be the proper width all the way around. If the seat is uneven, compression leakage will result. If the seat is too wide, seat pressure is reduced, causing carbon accumulation and possible compression loss. If the seat is too narrow, heat transfer from valve to seat is reduced and the valve may overheat and warp, resulting in burnt valves.

1. Install pilot into valve guide.



2. Apply cutting oil to valve seat and cutter.

3. Place 46° cutter on the pilot and make a light cut.



4. Inspect the cut area of the seat. If the contact area is less than 75% of the circumference of the seat, rotate the pilot 180° and make another light cut.

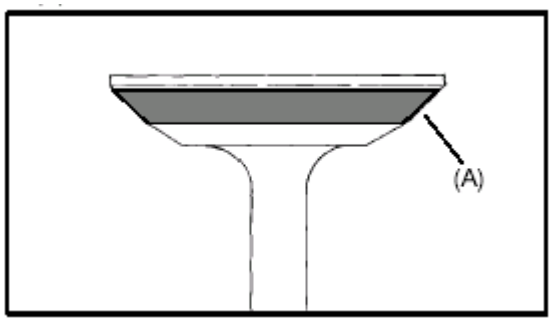
If the cutter now contacts the uncut portion of the seat, check the pilot. Look for burrs, nicks, or run out. If the pilot is bent it must be replaced.

If the contact area of the cutter is in the same place, the valve guide is distorted from improper installation and must be replaced. Be sure the cylinder head is at the proper temperature and replace the guide.

If the contact area of the initial cut is greater than 75%, continue to cut the seat until all pits are removed and a new seat surface is evident.

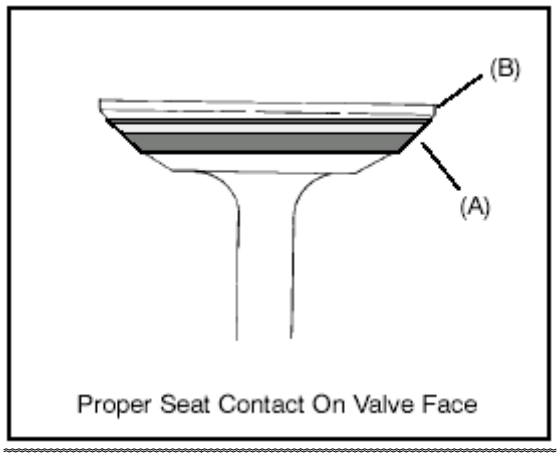
NOTE: Remove only the amount ofmaterial necessary to repair the seat surface.

5. To check the contact area of the seat on the valve face, apply a thin coating of PrussianBluetpaste to the valve seat. If using an interference angle (46°) apply black marker to the entire valve face (A).



6. Insert valve into guide and tap valve lightly into place a few times.

7. Remove valve and check where the Prussian Bluit or black marker indicates seat contact on the valve face. The valve seat should contact the middle of the valve face or slightly above, and must be the proper width (A).

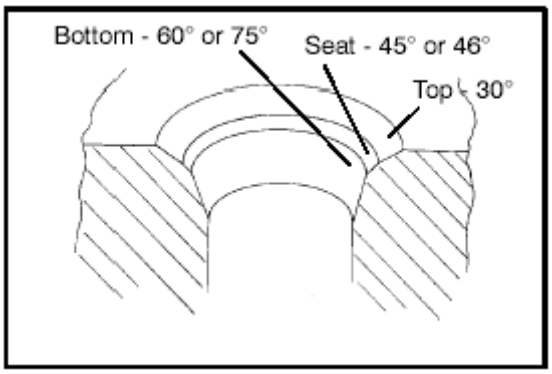


◎ If the indicated seat contact is at the top edge of the valve face and contacts the margin area(B) it is too high on the valve face. Use the 30° cutter to lower the valve seat.

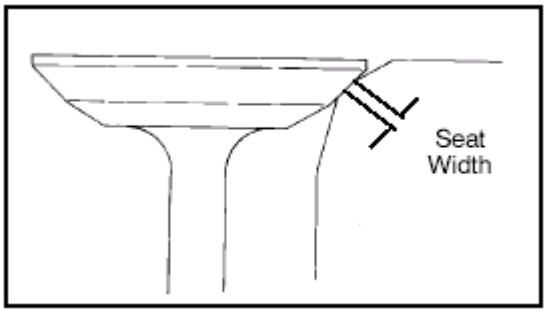
◎ If too low use the 60° or 75° cutter to raise the seat. When contact area is centered on the valve face, measure seat width.

◎ If the seat is too wide or uneven, use both top and bottom cutters to narrow the seat.

◎ If the seat is too narrow, widen using the 45° cutter and re-check contact point on the valve face and seat width after each cut.



NOTE: When using an interference angle, the seat contact point on the valve will be very narrow, and is a normal condition. Look for an even and continuous contact point on the black marker, all the way around the valve face.



8. Clean all filings from the area with hot soapy water, rinse, and dry with compressed air.
9. Lubricate the valve guides with clean engine oil, and apply oil or water based lapping compound to the face of the valve. Lapping is not required with an interference angle.
10. Insert the valve into its respective guide and lap using a lapping tool or a section of fuel line connected to the valve stem.
11. Rotate the valve rapidly back and forth until the cut sounds smooth. Lift the valve slightly off of the seat, rotate 1/4 turn, and repeat the lapping process. Do this four to five times until the valve is fully seated, and repeat process for the other valve.
12. Clean cylinder head, valves, and camshaft oil supply passages thoroughly.
13. Spray electrical contact cleaner into oil passages and dry using compressed air.

CYLINDER HEAD ASSEMBLY

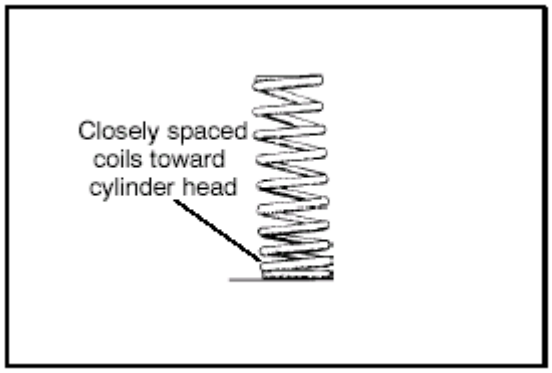
⚠ CAUTION

Wear eye protection during assembly.

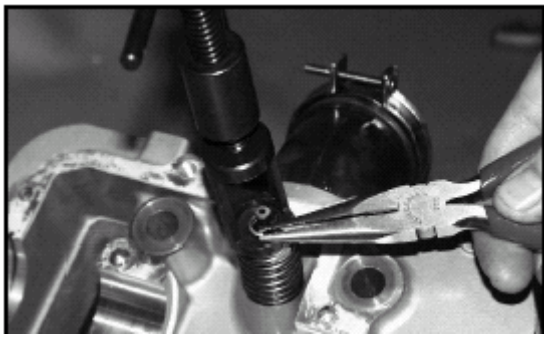
NOTE: Assemble the valves one at a time tomaintain proper order.

1. Install new valve seals on valve guides.

2. Apply engine oil to valve guides and seats.
3. Coat valve stem with molybdenum disulfide grease.
4. Install valve carefully with a rotating motion to avoid damaging valve seal.
5. Dip valve spring and retainer in clean engine oil and install spring with closely spaced coils toward the cylinder head.



6. Place retainer on spring and install valve spring compressor. Compress spring only enough to allow split keeper installation to prevent loss of spring tension. Install split keepers with the gap even on both sides.



7. Repeat procedure for remaining valve.

8. When all valves are installed, tap lightly with soft faced hammer on the end of the valves to seat the split keepers.

VALVE SEALING TEST

1. Clean and dry the combustion chamber area.
2. Pour a smallamount of cleaning solvent into each port and check for leakage around each valve.

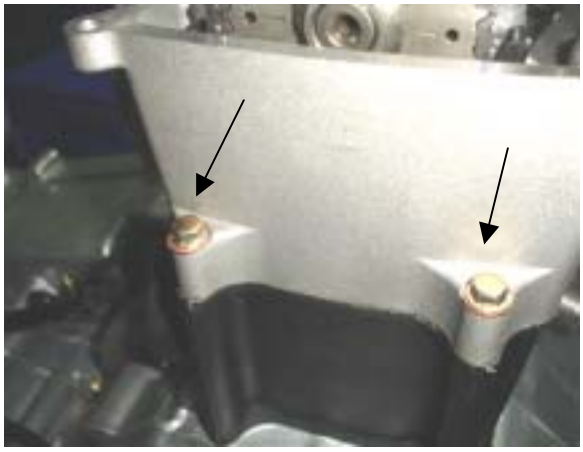
The valve seats should hold fluid with no seepage.

ENGINE BOTTOM END DISASSEMBLY

Cylinder Removal

Follow engine disassembly procedures to remove valve cover, camshaft and rocker arms, and cylinder head.

1. Remove cam chain guide at front of cylinder.
2. Remove the two 6 mm cylinder base bolts.



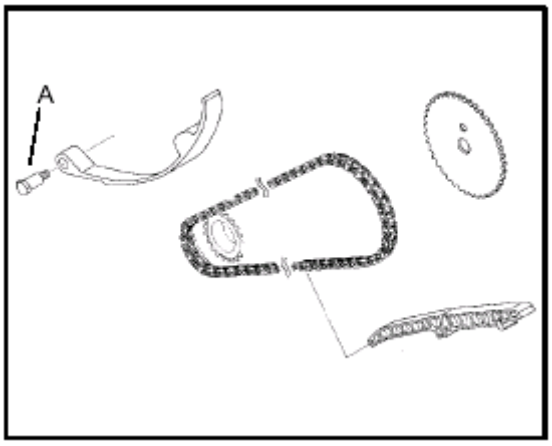
3. Remove coolant tube from cylinder.

4. Tap cylinder lightly with a plastic hammer in reinforced areas only until loose.

4. Rock cylinder forward and backward and lift it from the crankcase, supporting piston and connecting rod. Support piston with Piston Support Block.

CAM CHAIN FOLLOWER /TENSIONER BLADES

1. Remove bolt securing tensioner blade to crankcase A.



2. Remove blades and inspect for cracks, wear, or damage.

PISTON REMOVAL

1. Remove circlip. Note that opening for circlip access is on the exhaust side.
2. Remove piston circlip and push piston pin out of piston. If necessary, heat the crown of the piston *slightly* with a propane torch.

CAUTION
Do not apply heat to the piston rings. The ring may lose radial tension.

3. Remove the compression rings, starting with the top ring.

***Using a piston ring pliers**: Carefully expand ring and lift it off the piston.

CAUTION
Do not expand the ring more than the amount necessary to remove it from the piston, or the ring may break.

***By hand:** Placing both thumbs as shown, spread the ring open and push up on the opposite side. Use care to not scratch the ring lands.

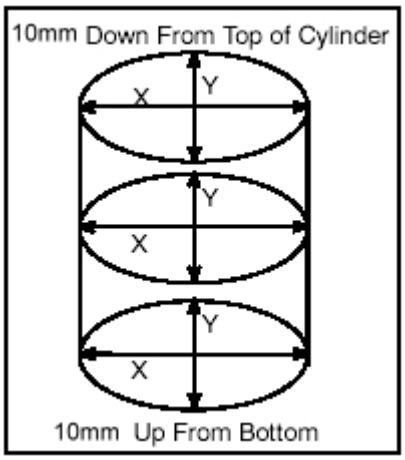
4. Repeat procedure for second ring.
5. The oil control ring is a three piece design consisting of a top and bottom steel rail and a center expander section. Remove the top rail first followed by the bottom rail and expander.

CYLINDER INSPECTION

1. Remove all gasket material from the cylinder sealing surfaces.
2. Inspect the top of the cylinder for warpage using a straight edge and feeler gauge.

Cylinder Warp:
0.05 mm MAX

3. Inspect cylinder for wear, scratches, or damage.
4. Inspect cylinder for taper and out of round with a telescoping gauge or a dial bore gauge. Measure in two different directions, front to back and side to side, on three different levels (10mm down from top, in the middle, and 10mm up from bottom).



5. Record measurements. If cylinder is tapered or out of round beyond specification, the cylinder must be honed, bored, or replaced.

Cylinder Taper
Limit: 0.05mm Max.
Cylinder Out of Round
Limit: 0.05mm Max.

CYLINDER HONE SELECTION/HONING PROCEDURE

⚠ CAUTION

A hone which will straighten as well as remove material from the cylinder is very important. Using a common spring loaded glaze breaker for honing is not advised. Goes recommends using a rigid hone or arbor honing machine. Cylinders may be wet or dry honed depending upon the hone manufacturer's recommendations. Wet honing removes more material faster and leaves a more distinct pattern in the bore.

HONING TO DEGLAZE

A finished cylinder should have a cross-hatch pattern to ensure piston ring seating and to aid in the retention of the fuel/oil mixture during initial break in. Hone cylinder according to hone manufacturer's instructions, or these guidelines:

◎ Use a motor speed of approximately 300-500 RPM, run the hone in and out of the cylinder rapidly until cutting tension decreases. Remember to keep the hone drive shaft centered (or cylinder centered on arbor) and to bring the stones approximately 1.3 cm above and below the bore at the end of each stroke.

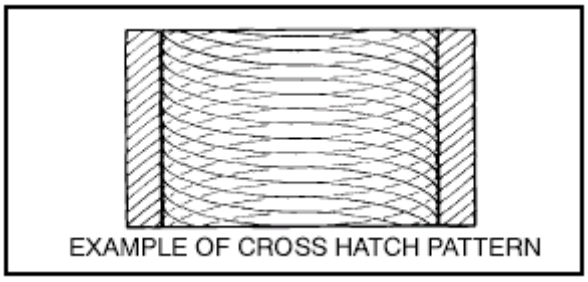
◎ Release the hone at regular intervals and inspect the bore to determine if it has been sufficiently deglazed, and to check for correct cross--hatch.

NOTE: **Do not allow cylinder to heat up during honing**.

◎ After honing has been completed, inspect cylinder for thinning or peeling.

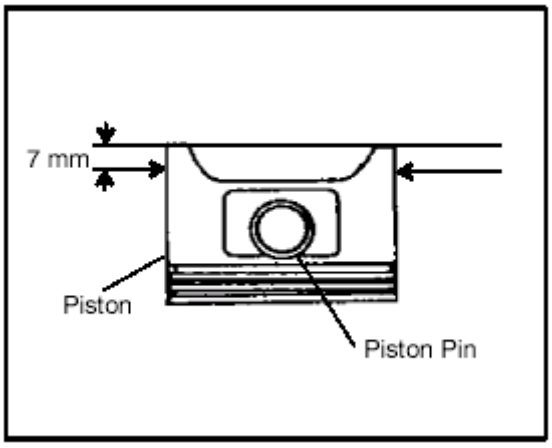
IMPORTANT: Clean the Cylinder After Honing

It is very important that the cylinder be thoroughly cleaned after honing to remove all grit material. Wash the cylinder in a solvent, then in hot, soapy water. Use electrical contact cleaner if necessary to clean these areas. Rinse thoroughly, dry with compressed air, and oil the bore immediately with 4 Cycle Lubricant to prevent the formation of surface rust. If cylinder wear or damage is excessive, it will be necessary to replace the cylinder. Hone only enough to deglaze the outer layer of the cylinder bore.


EXAMPLE OF CROSS HATCH PATTERN

PISTON INSPECTION

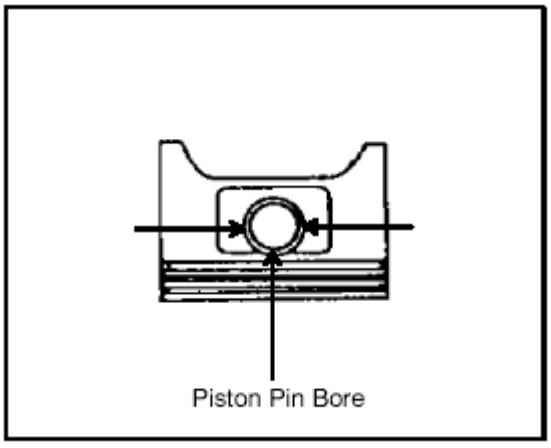
1. Measure piston outside diameter at a point 7mm up from the bottom of the piston at a right angle to the direction of the piston pin.



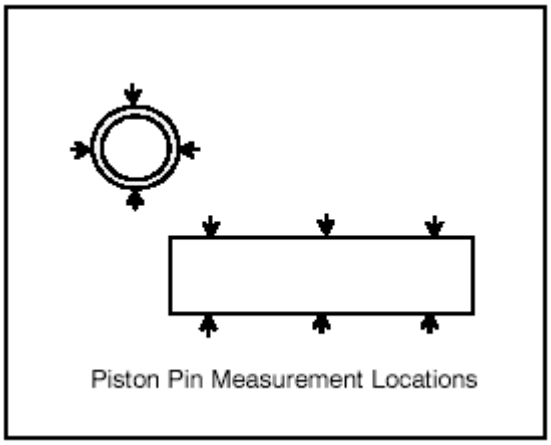
2. Subtract this measurement from the maximum cylinder measurement obtained earlier.

Piston to Cylinder Clearance
Std: 0.02-0.05 mm
Limit: 0.1 mm

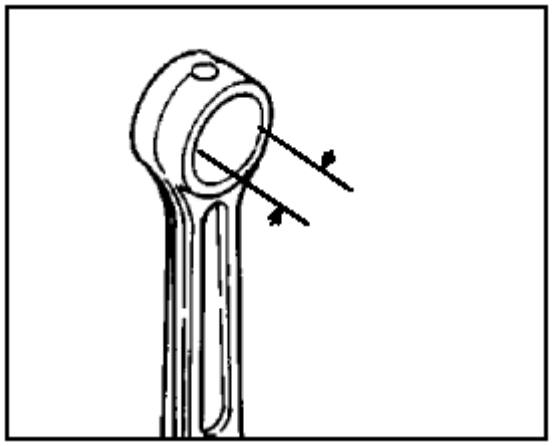
3. Measure piston pin bore. Replace piston if out--of--round



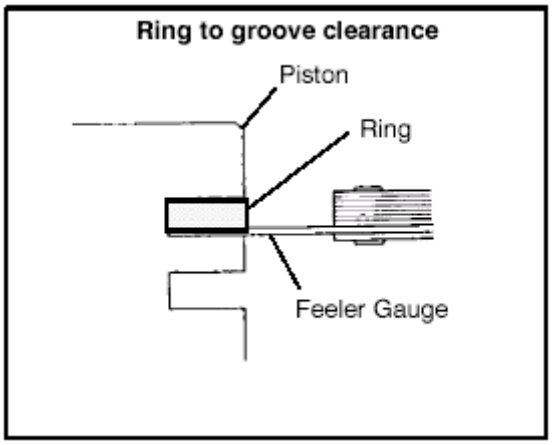
4. Measure piston pin O.D. Replace piston pin if out--of--round.



5. Measure connecting rod small end ID. Replace crankshaft if out--of--round.

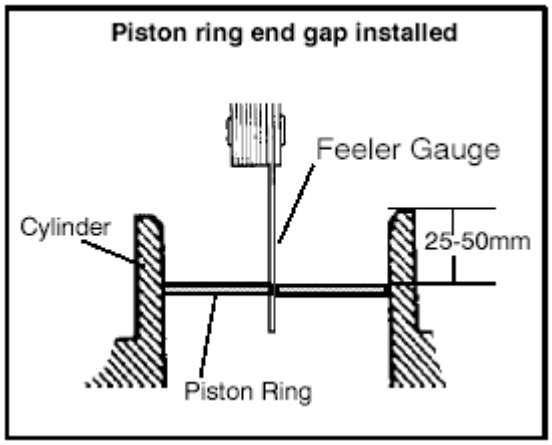


6. Measure piston ring to groove clearance by placing the ring in the ring land and measuring with a thickness gauge. Replace piston and rings if ring-to-groove clearance exceeds service limits.



PISTON RING INSTALLED GAP

1. Place each piston ring inside cylinder using piston to push ring squarely into place as shown.



Piston Ring Installed Gap
Top Ring
Std: 0.1--0.3 mm
Limit: 0.8 mm
Second Ring
Std: 0.35--0.5 mm
Limit: 1.0 mm
Oil Ring
Std: 0.2-0.7 mm
Limit: 1.5 mm

2. Measure the gap with a feeler gauge at both the top and bottom of the cylinder.

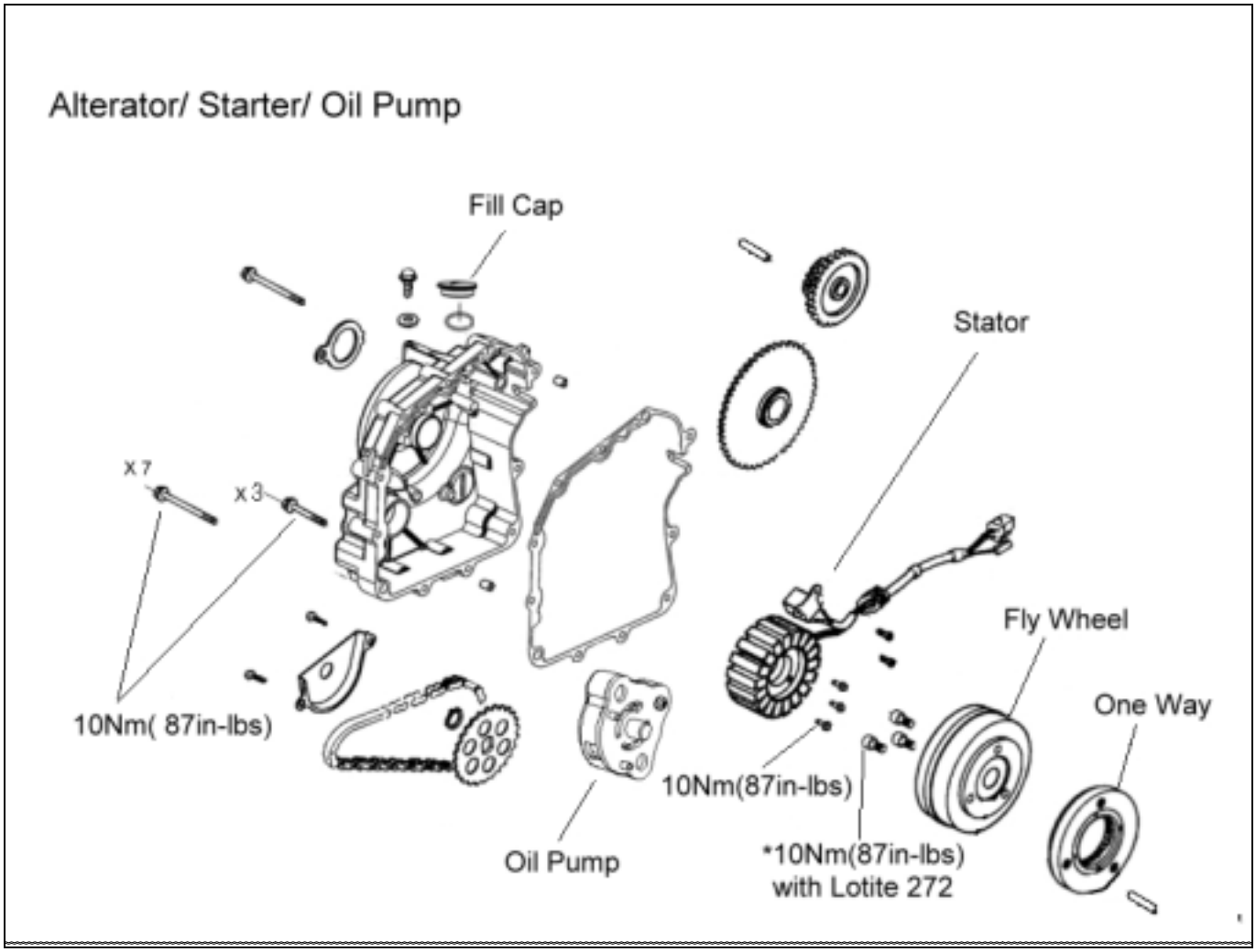
NOTE: Measure at two points in the cylinder

A difference in end gap indicates cylinder taper. The cylinder should be measured for excessive taper and out of round.

3. If the installed gap measurement exceeds the limit, replace the rings. If using new rings and the measurement is too small, file the ring ends to achieve the proper gap.

NOTE: Always check piston ring installed gap after re-boring a cylinder or when installing new rings. A re-bored cylinder should always be scrubbed thoroughly with hot soapy water, rinsed, and dried completely. Wipe cylinder bore with an oil rag immediately to remove residue and prevent rust.

ALTERATOR/ STATER/ OIL PUMP EXPLODED VIEW



NOTE: The CVT system, starter motor, starter drive, flywheel, stator, oil pump and transmission can be serviced with the engine in the frame.

STARTER DRIVE GEAR REMOVAL/ INSPECTION

1. Remove water pump tube.
2. Take off water pump bolts.
3. Tap water pump lightly with a plastic hammer in reinforced areas only until loose.

1. Remove stator housing bolts and remove housing.
2. Remove the start drive gear and shaft by pulling the shaft and tilting the gear slightly. Flywheel removal generally is not required

.

3. Measure the OD of the starter drive shaft on both ends for out--of--round.
4. Measure the ID of the bushing in the stator housing (A) and in the crankcase (B) in two directions 90° apart to determine if out--of--round. Calculate clearance. Replace components if clearance is excessive.

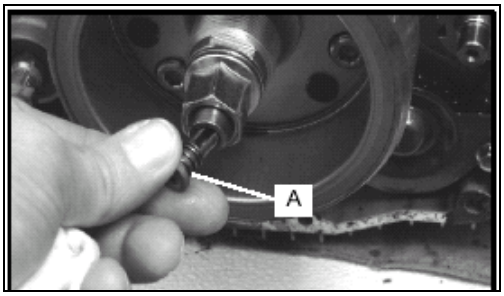
5. Inspect gear teeth on starter drive. Replace starter drive if gear teeth are cracked, worn, or broken.

FLYWHEEL REMOVAL / INSPECTION

⚠ CAUTION

The crankshaft end contains an oil passage plunge joint (A) as shown below. The plunger must be able to move in and out freely. Avoid damage to the crankshaft end or plunge joint and spring, which can cause loss of oil pressure, resulting in severe engine damage.

1.Remove the oil passage plunge joint, flywheel nut and washer.



2.Install Flywheel Puller.

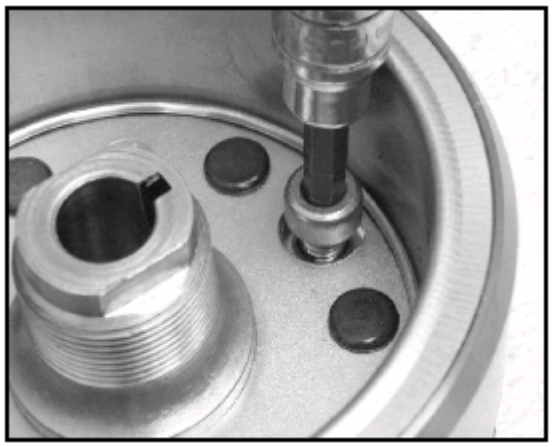
3. Remove flywheel.

CAUTION

Do not hammer or strike the tool while attached to the crankshaft end, which may become damaged.

FLY WHEEL/ ONE-WAY CLUTCH REMOVAL / INSPECTION

1. Remove the hex bolts that attach the one—way drive clutch to the flywheel.



2. Inspect the bearing surfaces and drive teeth for signs of wear or gouging. Replace the one-way clutch as an assembly if it is not working properly.

NOTE: One--way clutch components are not serviceable. Replace the component as an assembly.

3. To reattach the one way assembly, **apply Loctite**t **272** to the retaining screw threads. Torque to specification.

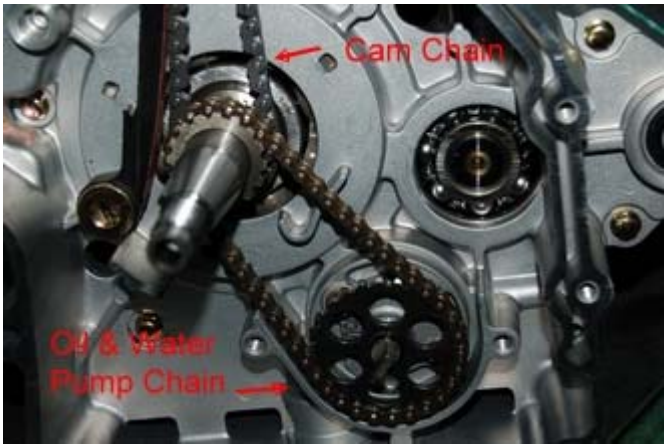
One--Way Clutch Screw Torque: 10 Nm

OIL PUMP DRIVE SPROCKET REMOVAL / INSPECTION

1. Remove the oil pump shield.

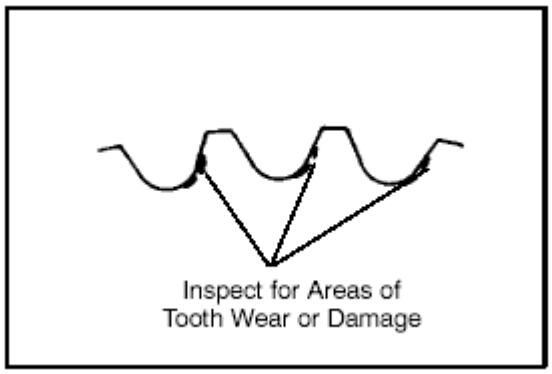
2. The outer chain is oil and water pump drive chain.

The inner chain is cam chain.



3. Remove pump chain drive sprocket circlip and chain from pump drive shaft and crankshaft.

4. Inspect sprocket teeth for wear or damage.



5. Replace any worn or damaged parts.

OIL PUMP REMOVAL

NOTE: Oil pump is not a serviceable assembly.

1. Remove the oil pump retaining screws.

2. Inspect the sprockets and chain for wear or damage. Inspect chain for worn or missing rollers or damage. Replace chain anytime the oil pump is replaced or if excessively worn.

CRANKCASE DISASSEMBLY

NOTE: Engine must be removed from the frame to perform any crankcase or crankshaft removal.

NOTE: The starter, starter drive, flywheel, stator, oil pump and transmission can be serviced with the engine in the frame.

CRANKCASE SEPARATION AND CAM CHAIN REMOVAL

NOTE: Stator housing, flywheel and gears have are previously removed for this procedure. Use care during the removal process to avoid damage to the cam chain.

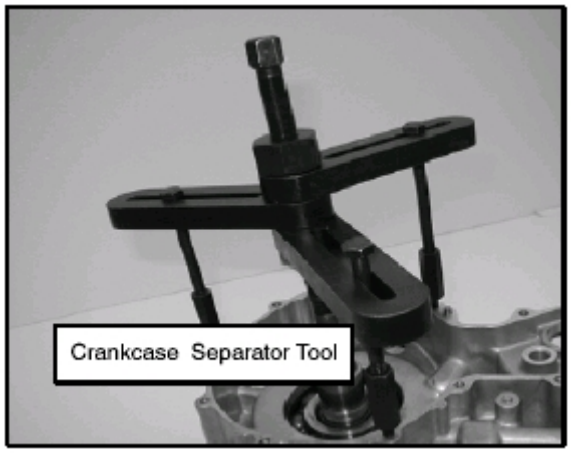
NOTE: Valve train and cylinder removal must be performed prior to this procedure.

NOTE: Always replace the pto crankshaft seal after performing this procedure.

1. Remove 4 flange bolts (circled) from the right side crankcase.

2. Separate crankcase using a hydraulic tool or by pressing on the pto end of the crankshaft using special tool.

NOTE: Remove the right hand crankcase with a soft faced hammer may also separate the cases. Use care not to damage the crankshaft end.



3. Watch the gap along the crankcase mating surface and separate the crankcase evenly.

4. Once the crankshaft bearing is free from the case, the crankshaft and cam chain can be removed by hand for service.

CRANKSHAFT REMOVAL

1. Remove right hand crankcase with soft faced hammer.
2. Press the crankshaft out. Use care not to damage the crankshaft oil passage on the right end crankshaft end.

NOTE: Use care not to damage the crankshaft end.

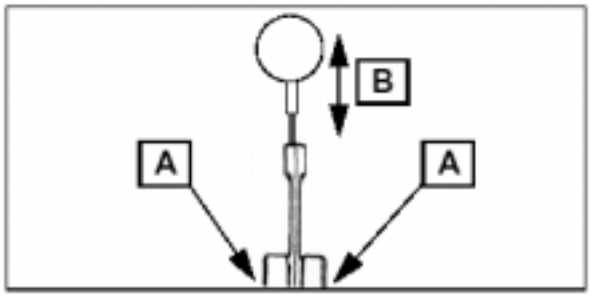
CRANKSHAFT / CAM & OIL CHAIN / SPROCKET INSPECTION

1. Inspect the crankshaft main bearings and cam and oil pump chain sprocket for wear or damage.

NOTE: Due to extremely close tolerances and minimal wear, the bearings must be inspected visually, and by feel. Look for signs of discoloration, scoring or galling. Turn the outer race of each bearing. The bearings should turn smoothly and quietly. The inner race of each bearing should fit tightly in the crankshaft. The outer race should be firm with minimal side to side movement and no detectable up and down movement.

2. Replace the crankshaft if the components fail visual inspection.

3. The connecting rod utilizes a roller bearing. Clearance is minimal and cannot be measured. Visually inspect bearing journal for scoring, damage or excessive wear. Replace crankshaft if it fails visual inspection.



4. Inspect the clearance of connecting rod big end and flywheel by feeling gauge. If clearance is excessive replace the crankshaft assembly.

Connecting rod clearance limit: 0.5 mm

5. Inspect chain for worn or missing rollers or damage. Replace if worn excessively or as part of any crankshaft repair.

CRANKCASE / BEARING INSPECTION

NOTE: Removal and installation of new seals is recommended anytime the crankcase is disassembled.

1. Inspect the bearings in the crankcase.

NOTE: Due to extremely close tolerances and minimal side wear, the bearing must be inspected visually and by feel. Look for signs of discoloration, scoring or galling. Turn the inner race of bearing. The bearing should turn smoothly and quietly. The outer race should fit tightly in the crankcase. The inner race should be firm with minimal side to side movement and no detectable up and down movement.

2. To remove crankcase bearings, use a blind hole bearing puller.

NOTE: Bearings are stressed during the removal procedure and *should not* be re-used.

3. Remove all traces of gasket sealer from the crankcase mating surfaces. Inspect the surfaces closely for nicks, burrs or damage.

CRANKCASE OIL STRAINER INSPECTION

1. Remove drain plug.

2. Remove oil strainer and visually inspect for any rips, tears or obstructions in screen.

3. Replace oil strainer if it fails visual inspection.

BEARING /SEAL INSTALLATION

NOTE: To ease crankcase bearing installation, warm the crankcase until hot to the touch. Placing the bearing in a freezer prior to installation will assist the assembly process.

1. Install the bearing so the numbers are visible.

2. Drive or press the new bearing into the crankcase, using the proper driver.

CAUTION
Press only on outer race of bearing to prevent bearing damage.

3. Install new seals with the lip facing in.

CAUTION
Press only on outer diameter to prevent damage.

CRANKCASE REASSEMBLY

Crankshaft and Cam/ Oil Chain Installation

Lubricate all bearings with clean engine oil before assembly.

1. Support the crankcase on blocks.
2. Install the balance shaft. Turn the flat up.

3. Install the PTO end of the crankshaft.

NOTE: Use care not to damage the crankshaft end.

⚠ WARNING
The balance shaft flat must square with crankshaft PTO end.

3. Install a new gasket onto the right hand crankcase half. Applying a thin amount of crankcase sealer to the gasket will help hold it in place.

4. Install 4 flange bolts (circled) from the right side crankcase.

NOTE: Use care not to damage the crankshaft end.

Crankcase Bolt Torque:
20 Nm(15ft. lbs)

5. Loop the cam chain through the chain room and secure with mechanic's wire.

OIL PUMP AND CHAIN INSTALLATION

NOTE: Oil pump is not a servicable assembly. Do not disassemble pump. Replace entire component.

1. Inspect the oil pump sealing surface on the crankcase. Apply a liberal amount of engine oil to the surfaces and pump.

2. Install oil pump as shown. Torque screws to specified torque.

Oil Pump Cover Screw Torque:
8 Nm

3. Install chain on oil pump and crankshaft sprocket then place oil pump sprocket into oil pump shaft

5. Install the circlip into oil pump shaft.

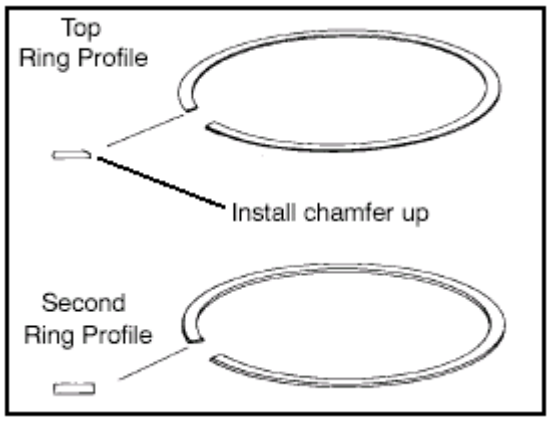
6. Install oil pump shield.

NOTE: Do not use gasket sealer on the pump mating surfaces.

PISTON RING INSTALLATION

NOTE: Apply clean engine oil to all ring surfaces and ring lands. Always check piston ring installed gap before rings are installed on piston. If the piston has been in service, clean any accumulated carbon from the ring grooves and oil control ring holes.

1. Place the oil control ring expander in oil ring groove with the end gap facing forward. The expander has no up or down marking and can be installed either way. The ends should butt squarely together and must not overlap.
2. Install the oil ring top rail with the end gap at least 30° from the end of the expander.
3. Install the bottom rail with the gap at least 30° from the end of the expander on the side opposite the top rail gap.

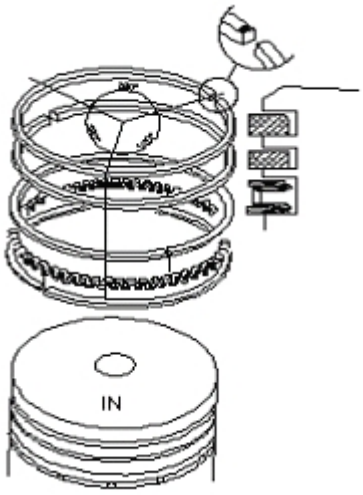


4. Install the second ring with the mark facing up. Position the end gap toward the rear (intake) side of the piston.
5. Install the top ring with the chamfered edge facing up.
6. Check to make sure the rings rotate freely in the groove when compressed by hand.

PISTON INSTALLATION

CAUTION: Do not re-use circlips. Circlips become deformed during the removal process. Do not compress the new clip more than necessary to prevent loss of radial tension. Severe enginedamage may result if circlips are re-used or deformed during installation.

1. Install a new circlip on one side of the piston with the end gap facing *up* or *down*.
2. Apply clean engine oil to the piston rings, ring lands, piston pin bore, piston pin, and piston skirt.
Lubricate the connecting rod (both ends) and crankshaft main bearing area.
3. **IMPORTANT-- Install the piston on the connecting rod with the 'IN" casting mark facing the intake side of engine. The piston pin should be a push fit into the piston.**



4. Install the other circlip with the gap facing up or down. (See Caution with Step 3 above). Push the piston pin in both directions to make sure the clips are properly seated in the groove.
5. Place the dowel pins in the crankcase and install a new cylinder base gasket.
6. Lubricate the piston and rings with assembly lube and install a ring compressor on the piston assembly. Verify that the ring gaps are 120° apart from each other before installation.

7. Push the rings into the taper using a metallic, blunt--edge tool while holding the cylinder down. This will help push the piston past the ring taper into the cylinder.

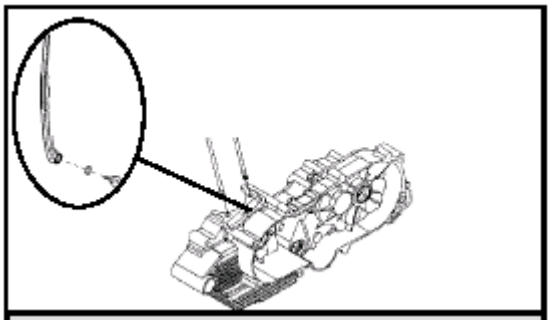
8. Up-side-down cylinder then place the blunt--edge tool on cylinder. Align it with cylinder.

9. Place piston into blunt--edge tool.

9. Use non-metallic rod to push piston until piston through the tool to cylinder.

TENSIONER BLADE INSTALLATION

1. Install the tensioner blade and tighten the mounting bolt to specified torque.



Tensioner Blade Mounting Bolt Torque:
10 Nm (7.4 ft. lbs.)

CYLINDER INSTALLATION

NOTE: Clean the gasket surfaces on the crankcase and cylinder. Remove all traces of old gasket material and apply a new base gasket

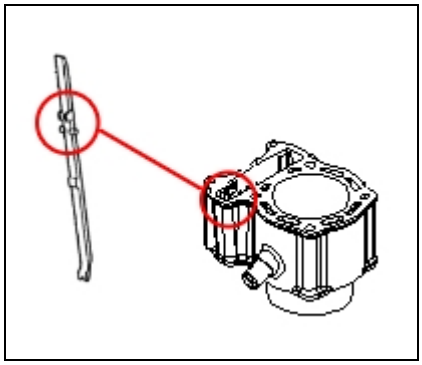
1. Install the dowel pin(s). Install an new base gasket onto the mating surface and install the piston into cylinder.

NOTE: Route cam chain through the cylinder chain room and secure it, holding it up while rotating the engine to avoid damage to the chain, drive sprocket teeth or tensioner blade.

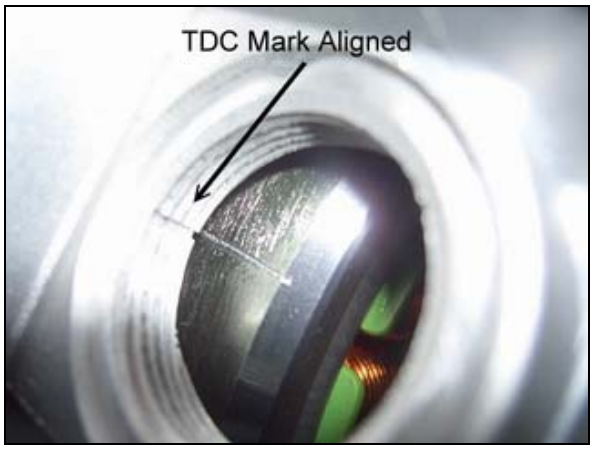
2. Apply clean engine oil liberally to the bore and tapered area of the cylinder. Place the cylinder on to the studs.

3. Install the cam chain guide and dowel pins into the cylinder. Verify the bottom end is seated properly in the crankcase.

4. Pull the cam chain through the cylinder chain room and secure with mechanic's wire.



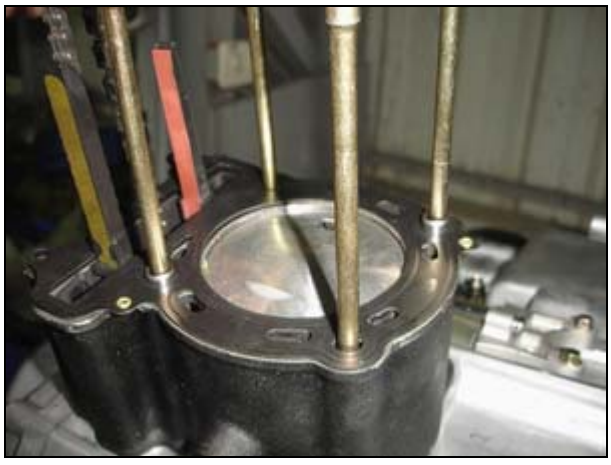
5. Position crankshaft at Top Dead Center (TDC) on compression stroke.



CYLINDER HEAD AND CAMSHAFT INSTALLATION

NOTE: Clean the gasket surfaces on the cylinder head and cylinder. Remove all traces of old gasket material.

1. Install the dowel pin(s) and a new cylinder head gasket.



2. Pull the cam chain through the cylinder head chain room and secure with mechanic's wire.
3. Place the cylinder head on the cylinder.

4. Install the cam according to the "Cam Shaft Timing" procedure. Verify the cam chain is in place around the crankshaft gear.

NOTE: Verify camshaft timing procedure before installing the rocker shaft assembly.

CAMSHAFT TIMING

⚠ CAUTION

Serious engine damage may result if the camshaft is not properly timed to the crankshaft.

IMPORTANT CAMSHAFT TIMING NOTE:

In order to time the camshaft to the crankshaft, the piston must be precisely located at Top Dead Center (TDC). This can be accomplished using one of two methods.

1. Install the cam chain over the crankshaft.

When the stator housing is removed, use Method 1

This method uses the camshaft gear marks and the crankshaft keyway to establish TDC. It is important to note that this method can only be used when the stator housing is removed and the crankshaft keyway is in view. The camshaft sprocket alignment marks are parallel to the gasket surface, and camshaft lobes are pointing down. The cam chain plate links *are not* used to time the camshaft.

When the stator housing is installed, use Method 2

This method establishes accurate Top Dead Center (TDC) by aligning the single mark on the flywheel with the notch in the timing inspection hole (see Method 2). The camshaft sprocket alignment marks are parallel to the gasket surface, and camshaft lobes are pointing down. The cam chain plate links *are not* used to time the camshaft.

Camshaft Installation - Timing Method 1
Refer to Illustration Page 4.37

Stator housing is removed: **NOTE:** Use this method only when the stator is removed and cam shaft drive sprocket is in view.

1. Rotate the crankshaft until the keyway on the crankshaft is pointed 'UP" (keyway facing upward).
2. Align the cam chain onto the teeth of the crankshaft sprocket. Use a wire to pull the chain up through the cylinder and cylinder head and to hold it in place. Secure the chain.
3. Apply grease, or engine assembly lubricant to the camshaft main journals and cam lobes. Lubricate automatic compression release mechanism with clean engine oil.
4. Orientate the camshaft with the lobes facing downward.
5. Disconnect the wire securing the cam chain and loop the cam chain over the sprocket while verifying the cam is inserted with the alignment marks parallel to the gasket surface.

6. Check all cam timing marks to verify proper cam timing, and install the rocker arm assembly. Torque the cylinder stud nuts to specification.

NOTE: Do not rotate engine until tensioner and rocker assembly is installed.

7. Install the tensioner and rocker assembly.

8. After tensioner installation, rotate engine at least two revolutions and re-check marks/timing.

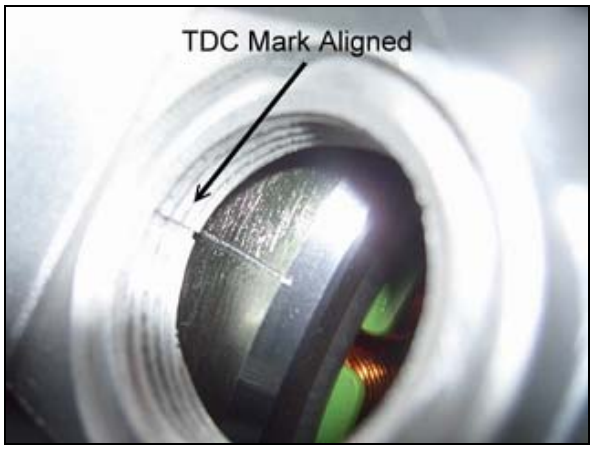
Camshaft Installation - Timing Method 2

Refer to Illustration Page 4.38

Stator housing is installed: **NOTE:** Use this method only when the stator is installed and cam shaft drive sprocket is in view.

1. Rotate the crankshaft until the single (TDC) timing mark (Top Dead Center) on the flywheel is view in the center of the timing inspection window.

Be sure to use the *single* TDC mark when installing the cam. Do not use any advance marks (if evident).



2. Align the cam chain onto the teeth of the cam chain drive sprocket. Use a wire to pull the chain up through the cylinder and cylinder head and to hold it in place. Secure the chain.

3. Apply grease , or molybdenum disulfide grease to the camshaft main journals and cam lobes. Lubricate automatic compression release mechanism with clean engine oil.

4. Orientate the camshaft with the lobes facing downward.

5. Disconnect the wire securing the cam chain and loop the cam chain over the sprocket while verifying the cam is inserted with the alignment marks parallel to the gasket surface.

6. Check all cam timing marks to verify proper cam timing, and install the rocker arm assembly. Torque the cylinder stud nuts to specification.

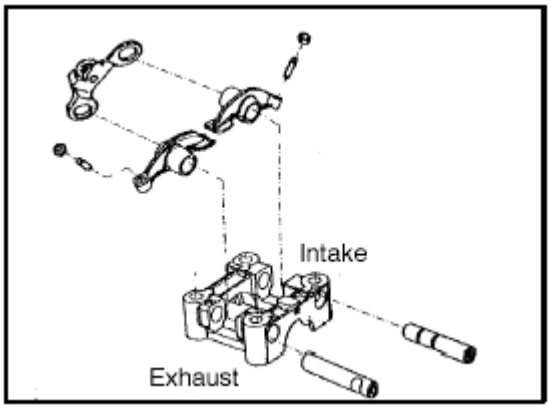
NOTE: Do not rotate engine until tensioner and rocker assembly is installed.

7. Install the tensioner and rocker assembly.

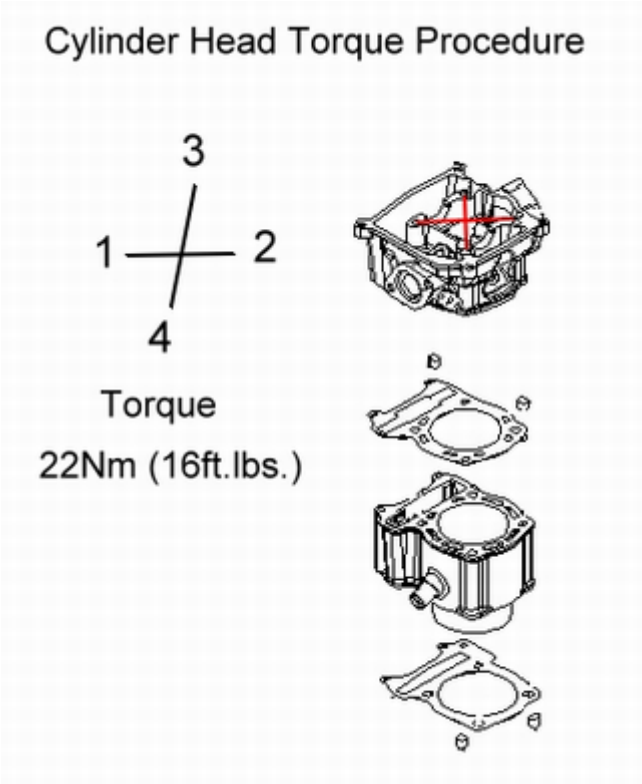
8. After tensioner installation, rotate engine at least two revolutions and re-check marks/timing.

ROCKER SHAFT/ARM INSTALLATION

1. Assemble arms, shafts and decompression components into cam support.



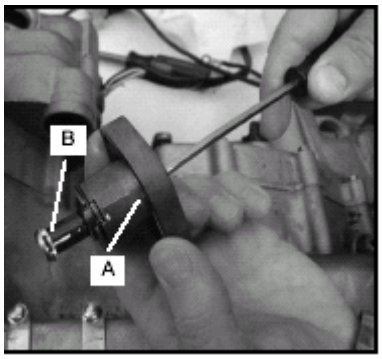
2. Install and tighten rocker shaft locking plate. Tighten to specification.
3. Apply engine assembly lube to the cam lobes and cam follower surfaces.
4. Verify the cam lobes are pointing downward before installing rocker assembly.
5. Apply clean engine oil liberally to the valve springs, cam chain, rocker arms, and camshaft.
6. Install cylinder head nuts and torque to specification.



7. Adjust valves according to the "VALVE **CLEARANCE ADJUSTMENT PROCEDURES" , Page4.39.**
8. Install rocker cover and torque bolts to specification.

CAM CHAIN TENSIONER INSTALLATION

1. Using a small flat blade screwdriver, turn the tensioner clockwise to retract the plunger (B) all the way into the tensioner body.



2. With the plunger retracted, install the tensioner assembly with a new gasket and tighten the bolts to specification.

Tensioner Bolt Torque:
10 Nm (7.4 ft. lbs.)

3. Install the tensioner cap. Torque cap to specification.

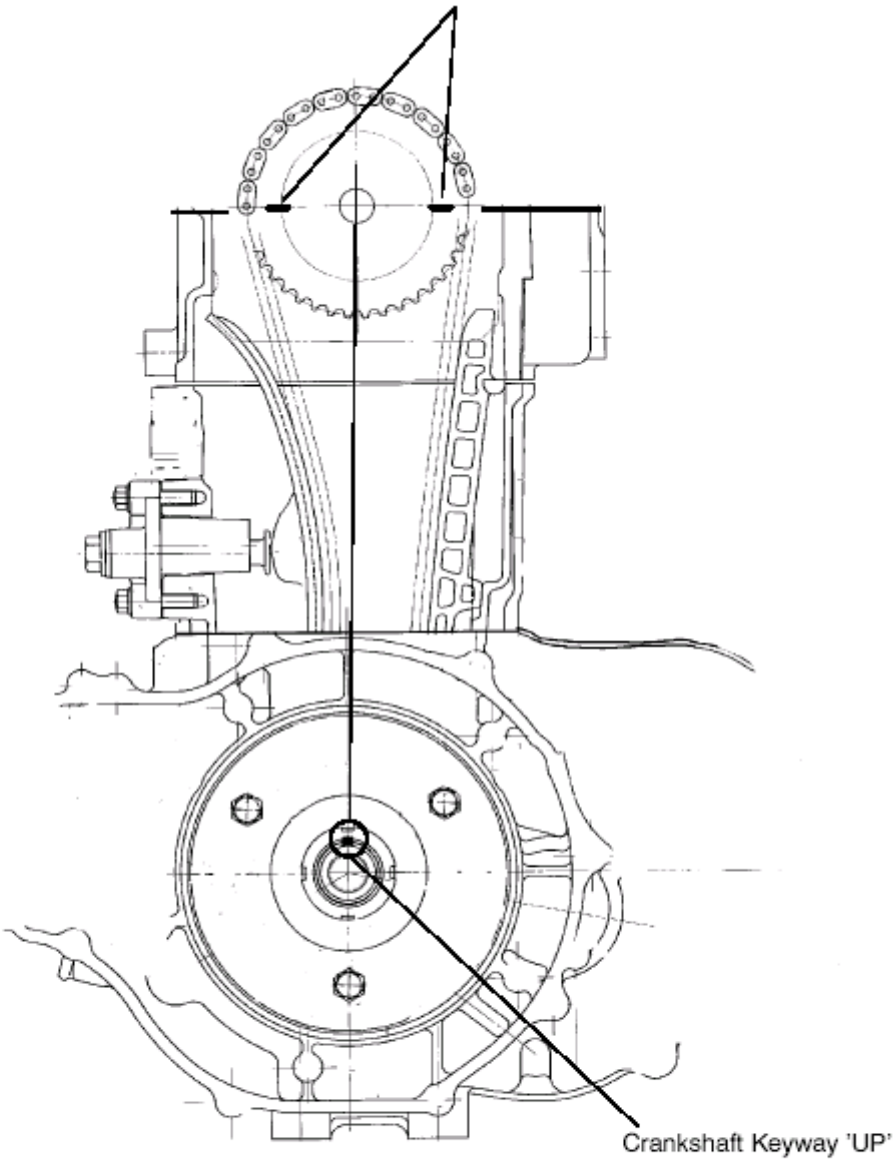
Tensioner Cap Torque:
10 Nm (7.4 ft. lbs.)

4. Slowly rotate engine two to three revolutions and re-check cam timing once chain is tight.

CAMSHAFT TIMING - METHOD 1

Method 1 - Camshaft Timing with Stator Housing Removed

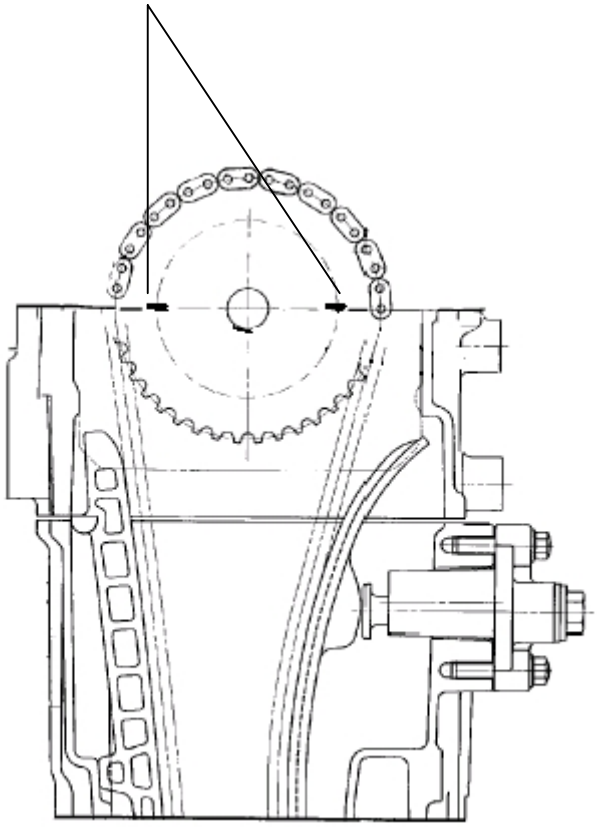
Sprocket marks aligned with gasket surface at TDC on compression stroke (cam lobes facing downward)

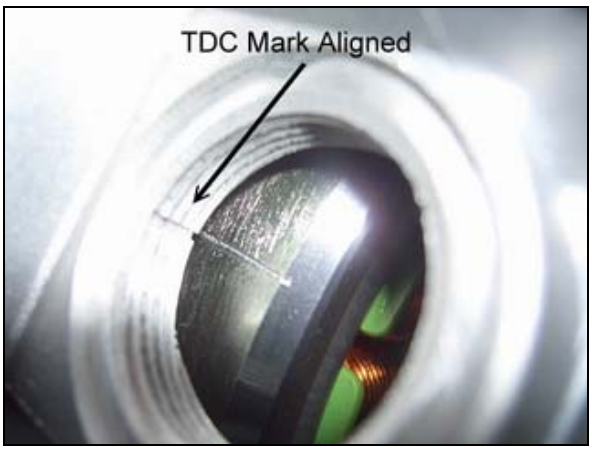


CAMSHAFT TIMING - METHOD 2

Method 2 - Camshaft Timing Using Flywheel TDC Mark

Sprocket marks aligned with gasket surface at TDC on compression stroke (cam lobes facing downward)





Cam Timing

(View through timing inspection hole)

Position crankshaft at TDC

INTAKE VALVE CLEARANCE ADJUSTMENT

1. Verify cam lobes are pointed down.
2. Insert a 0.1mm feeler gauge between end of intake valve stem and adjuster screw.
3. When clearance is correct, hold adjuster screw and tighten locknut securely.
4. Re-check the valve clearance.
5. Repeat adjustment procedure if necessary until clearance is correct with locknut secured.

VALVE CLEARANCE
0.1 mm

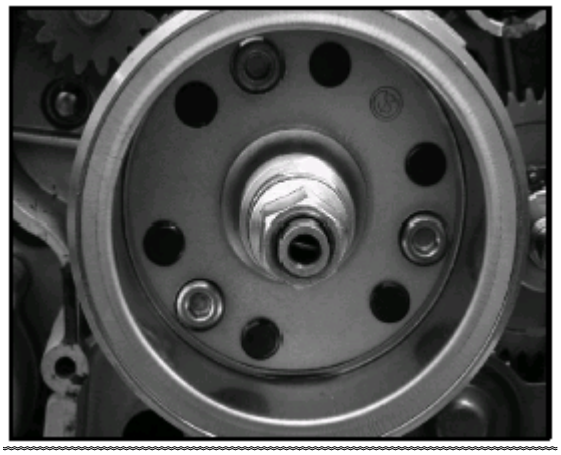
EXHAUST VALVE CLEARANCE ADJUSTMENT

1. Verify cam lobes are pointed down.
2. Insert a 0.1mm feeler gauge between end of exhaust valve stem and adjuster screw.
3. Loosen locknut and turn adjuster screw until there is a slight drag on feeler gauge.
4. When clearance is correct, hold adjuster screw and tighten locknut securely.
5. Re-check the valve clearance.
6. Repeat adjustment procedure if necessary until clearance is correct with locknut secured.

VALVE CLEARANCE
0.1 mm

FLYWHEEL INSTALLATION

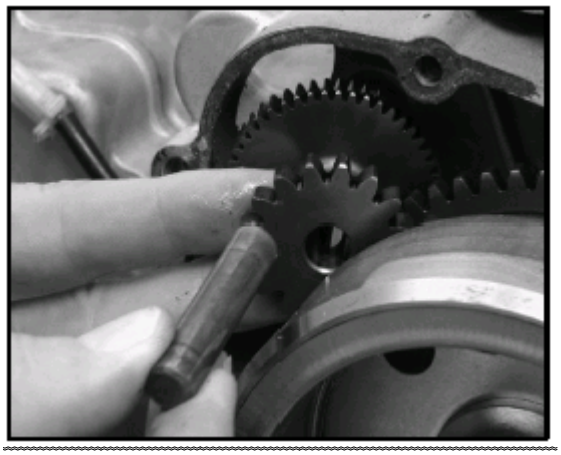
1. Install flywheel key, flywheel washer, and nut. Torque flywheel nut to specification.



Flywheel Nut Torque:
100 Nm with

STARTER DRIVE ASSEMBLY

1. Be sure the washer is positioned on the back of the drive gear.

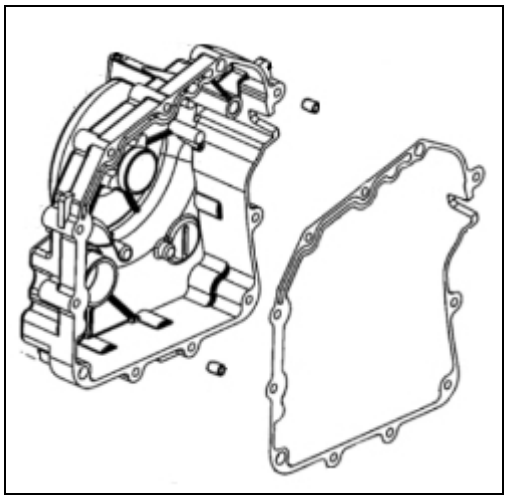


2. Apply Starter Drive Grease to the drive bushings in the cases and all moving surfaces of the starter drive gears and install.
3. Install stator housing and torque bolts to specification.

STATOR HOUSING INSTALLATION

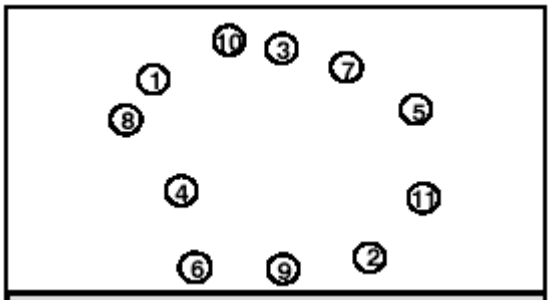
NOTE: The stator, flywheel, starter drive, and stator can be serviced with the engine in the frame.

1. Apply a light amount of Crankcase Sealant to the mounting surface and install a new gasket. Install the dowel pins.



2. Seal stator wire grommet with Crankcase Sealant.

3. Install the housing. Torque bolts in sequence to specification.



Stator Cover Bolt Torque:
8 Nm (6 ft. lbs.)

SPARK PLUG FOULING TROUBLESHOOTING

◎ Spark plug cap loose or faulty

◎ Choke cable adjustment or plunger/cable sticking

◎ Foreign material on choke plunger seat or plunger

◎ Incorrect spark plug heat range or gap

◎ Carburetor inlet needle and seat worn

◎ Jet needle and/or needle jet worn or improperly adjusted

◎ Excessive carburetor vibration (loose or missing needle jet locating pins)

◎ Loose jets in carburetor or calibration incorrect for altitude/temperature

◎ Incorrect float level setting

◎ CVT system calibrated incorrectly or components worn or mis-adjusted

◎ Fuel quality poor (old) or octane too high

◎ Low compression

◎ Restricted exhaust

◎ Weak ignition (loose coil ground, faulty coil, or stator,)

◎ Restricted air filter (main or pre-cleaner) or breather system

◎ Improperly assembled air intake system

◎ Restricted engine breather system

◎ Oil contaminated with fuel

◎ Restricted crankcase vent

TROUBLESHOOTING

Engine Turns Over But Fails to Start

◎ No fuel
◎ Dirt in fuel line or filter
◎ Fuel will not pass through fuel valve
◎ Fuel pump inoperative/restricted
◎ Tank vent plugged
◎ Carb starter circuit
◎ Engine flooded
◎ Low compression (high cylinder leakage)
◎ No spark (Spark plug fouled)

Engine Does Not Turn Over

◎ Dead battery
◎ Starter motor does not turn
◎ Engine seized, rusted, or mechanical failure
◎ Kickstart components damaged

Engine Runs But Will Not Idle

◎ Restricted carburetor pilot system
◎ Carburetor misadjusted
◎ Choke not adjusted properly
◎ Low compression
◎ Crankcase breather restricted
◎ Air filter restriction

Engine Idles But Will Not Rev Up

◎ Spark plug fouled/weak spark
◎ Broken throttle cable
◎ Obstruction in air intake
◎ Air box removed (reinstall all intake components)
◎ Incorrect or restricted carburetor jetting
◎ Reverse speed limiter limiting speed
◎ Carburetor vacuum slide sticking/diaphragm damaged
◎ Incorrect ignition timing
◎ Restricted exhaust system
◎ Cam Lobe worn

Engine Has Low Power

◎ Spark plug fouled
◎ Cylinder, piston, ring, or valve wear or damage (check compression)
◎ CVT not operating properly
◎ Restricted exhaust muffler
◎ Dirty carburetor
◎ Cam lobe worn

Piston Failure - Scoring

◎ Lack of lubrication
◎ Dirt entering engine through cracks in air filter or ducts
◎ Engine oil dirty or contaminated

Excessive Smoke and Carbon Buildup

◎ Worn rings, piston, or cylinder
◎ Excessive piston-to-cylinder clearance
◎ Worn valves, guides or seals
◎ Restricted crankcase vent
◎ Air filter dirty or contaminated

Low Compression

◎ Decompressor stuck
◎ Cylinder head gasket leak
◎ No valve clearance or incorrectly adjusted
◎ Cylinder or piston worn
◎ Piston rings worn, leaking, broken, or sticking
◎ Bent valve or stuck valve
◎ Valve spring broken or weak
◎ Valve not seating properly (bent or carbon accumulated on valve area)
◎ Rocker arm sticking

Backfiring

◎ ETC or speed limiter system malfunction
◎ Fouled spark plug or incorrect plug or plug gap
◎ Carburetion faulty - lean condition
◎ Intake / Exhaust system air leaks
◎ Ignition system faulty:
◎ Spark plug cap cracked/broken
◎ Ignition coil faulty
◎ Ignition or kill switch circuit faulty
◎ Ignition timing incorrect
◎ Sheared flywheel key
◎ Poor connections in ignition system
◎ System wiring wet
◎ Cam lobe worn or Valve sticking
◎ Lean condition

CHAPTER 5
TRANSMISSION

TRANSMISSION 5.1
TRANSMISSION ASSEMBLY 5.2
TRANSMISSION DISASSEMBLY AND INSPECTION 5.2
SHIFT SYSTEM REMOVAL 5.2
TRANSMISSION DISASSEMBLY 5.3

TRANSMISSION INSPECTION 5.4
DRIVE SHAFT REMOVAL AND INSPECTION 5.4
SHIFT FORK INSPECTION. 5.5
MIAN SHAFT REMOVAL AND INSPECTION. 5.5
COUNT SHAFT INSPECTION. 5.6
OUTPUT SHAFT REMOVAL AND INSPECTION. 5.6
SHIFT DRUM REMOVAL AND INSPECTION. 5.7
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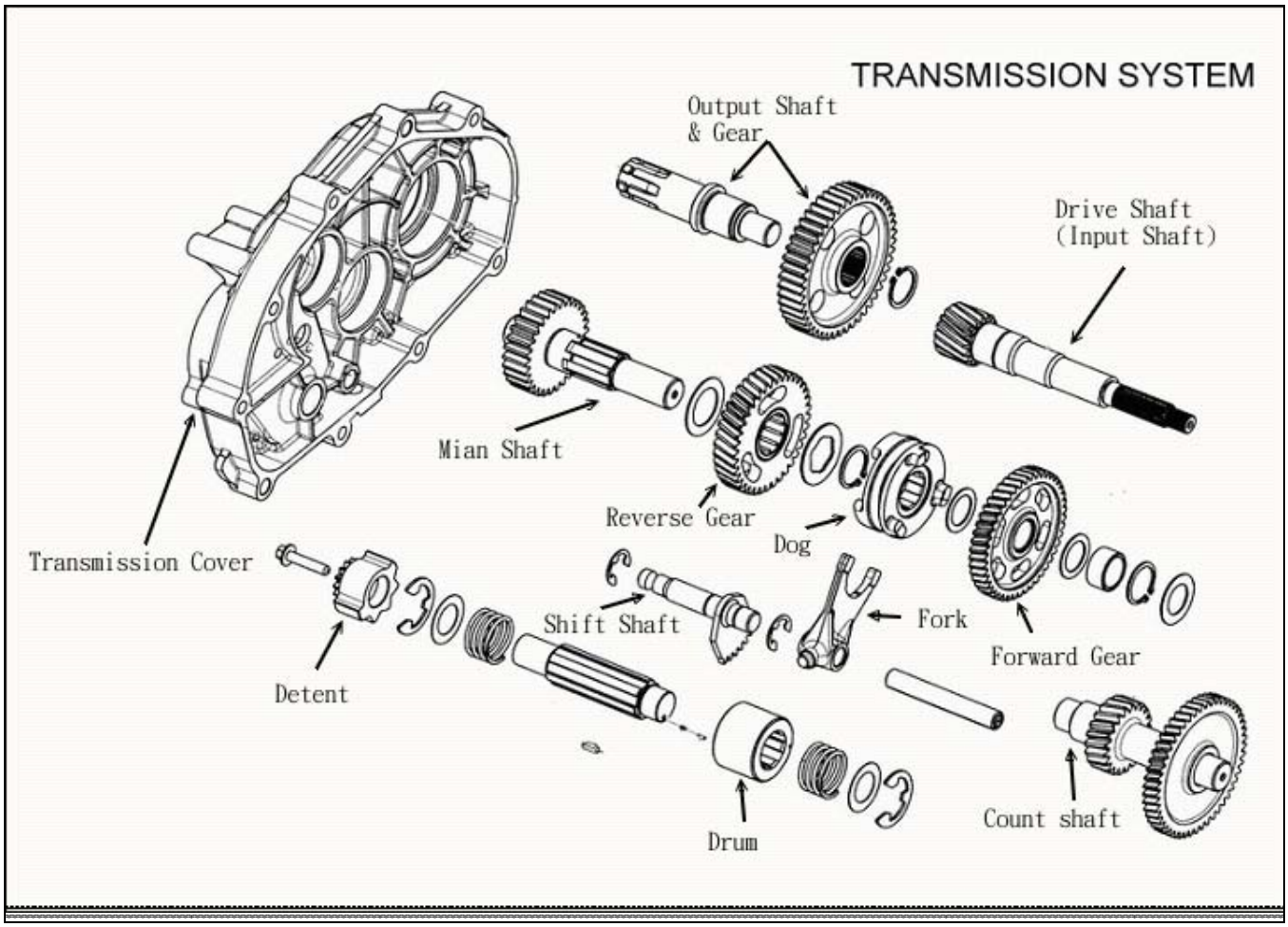
TROUBLE SHOOTING 5.9
GEAR WILL NOT ENGAGE 5.9
POPS OUT OF GEAR 5.9
NOIS 5.9

Transmission Assembly

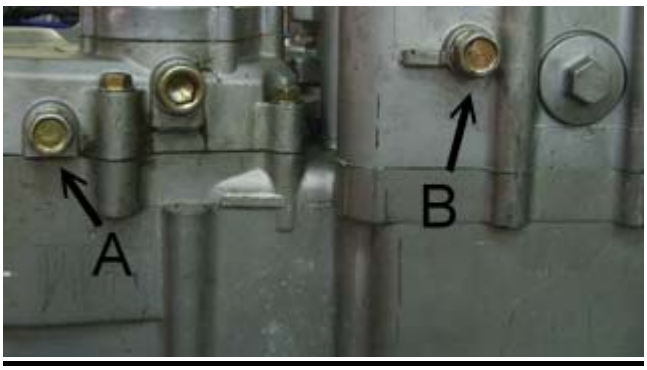


TRANSMISSION

Transmission Disassembly and Inspection

NOTE: Engine removal is not required to service transmission components. Process shown below is with engine removed for clarity.

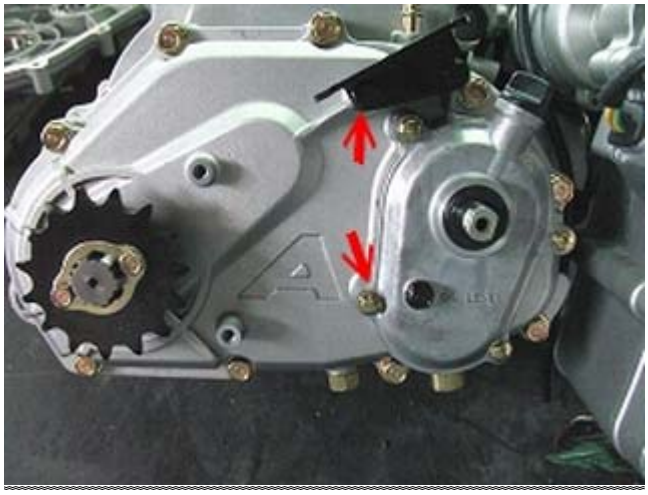
1. Drain the transmission oil from the gear case (A) and engine oil from crankcase (B).



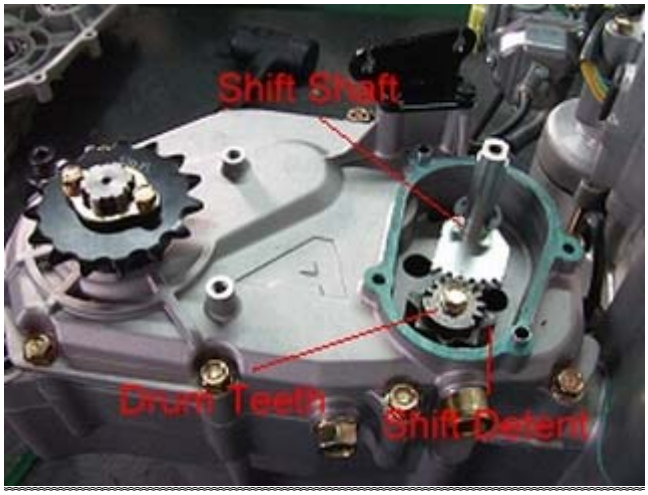
Shift System Removal

1. Remove right footwell.
2. Remove sprocket cover and drive sprocket.
3. Remove shift cables from the bracket.

4. Remove shift cover and cables bracket screws.



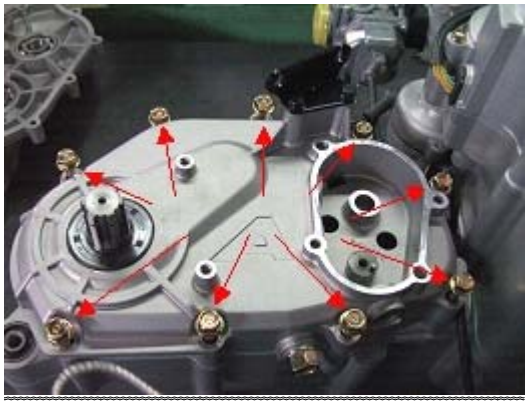
5. Remove shift cover and the bracket.
6. Remove gasket and discard.
7. Note timing of shift shaft before removing. The center tooth on shift shaft is positioned between the two dots on the drum teeth.



8. Remove the shift shaft by pulling straight outward.
9. Remove detent ball, spring and socket bolt.
10. Remove shift detent.

Transmission Disassembly

1. Remove the cover screws.



2. Remove cover or with output shaft. Push or tap on shift shaft to keep it in the case.
3. Remove gasket and discard.

4. Remove output shaft

5. Remove main shaft and shift fork as an assembly.

6. Remove the counter shaft.

Note: Do not lose those two washers.

7. If input shaft or gear requires service, remove driven clutch as outlined in CVT Chapter.

8. Remove above two bolts.

9. Remove input shaft from CVT side by plastic hammer until loose.

Transmission Inspection

NOTE: Always wear the appropriate protective gear and use caution when operating a press.

Drive shaft removal and inspection

1. With transmission components removed, inspect all shaft bearings visually and by feel. Bearings should roll smoothly, without excessive movement or noise. Replace any bearing that is removed, as the removal process destroys the bearing.

2. Bearings can be removed using a standard blind bearing remover. Apply lithium grease to outer race of new bearings and press into cover or case by the outer race. Do not press on inner race or bearing will be damaged.

3. The sealed drive shaft bearing has a snap ring that must be removed then drive shaft bearing can be removed.

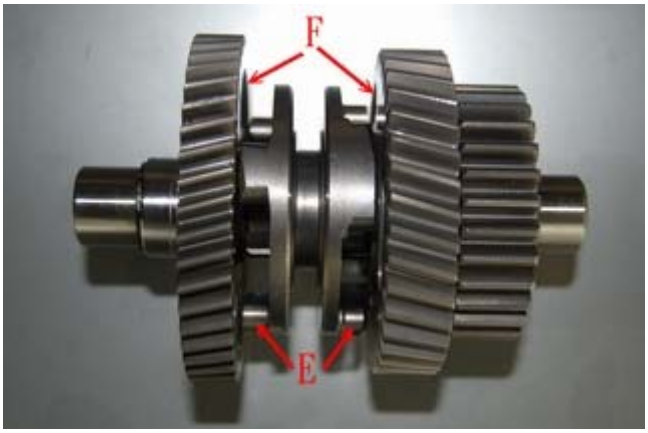
4. Assemble the drive shaft, bearing, a new snap ring.

Shift fork inspection

1. Inspect the shift fork (B) for scoring or signs of wear. Area C should not show contact.

Main shaft removal and inspection

1. Inspect sliding gear dogs (E) and dog slots in the mating gears
(F) for wear or damage. The edges of dogs and slots should be square and not rounded. Replace both sliding gear and mating gears if any edges are rounded or chipped.



2. Substantial axial movement in the forward drive gear is due to liberal oil clearance for the bushing, and is a normal condition. Gear replacement is not required due to axial movement if radial movement (shown in Step 6) passes inspection.

3. Radial movement should not exceed 0.05 mm.

3. Remove the snap ring from main shaft.

4. Remove forward gear and dog components until next snap ring.

5. Remove second snap ring from main shaft.

6. Remove reverse gear components.

CAUTION

Snap ring pressure can cause rings and pliers to eject suddenly. Use care during removal.

7. Inspect the shaft and gears visually without excessive wear or crack. Replace any damaged components.
8. Assemble the reverse gear, washer, a new snap ring, and the sliding gear on the shaft.
9. Assemble the forward gear, washer, bush and a new snap ring, on the shaft.

Counter shaft inspection

1. Inspect the shaft and gears visually without excessive wear or crack. Replace any damaged components.

Output shaft removal and inspection

1. Remove the snap ring from output shaft.

2. Remove the gear ring from output shaft.

3. Inspect the shaft and shaft excessive wear or crack.

4. Assemble the output gear and a new snap ring on the shaft.

Shift drum removal and inspection

⚠ CAUTION

Spring pressure can cause components to eject suddenly. Use care during removal. Always wear the appropriate protective gear

1. Remove shift sensor from drum shaft.

NOTE: Drum shaft components are not serviceable. Replace Drum shaft as an assembly.

Transmission Reasssembly

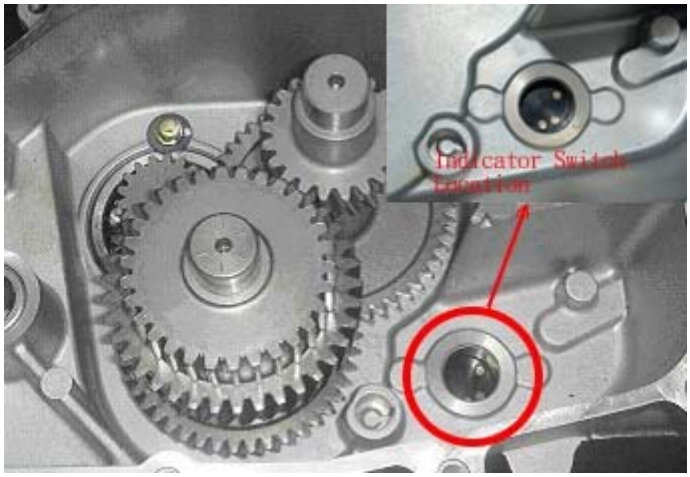
NOTE: Lubricate all bearings with clean transmission oil before assembly.

Clean the gasket surfaces on the crankcase and transmission cover. Remove all traces of old gasket material and apply a new base gasket

1. Place the counter shaft into case.

2. Place main shaft washer on bearing housing.

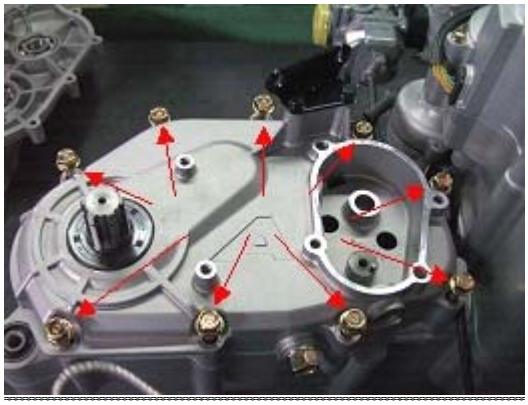
3. Place main shaft into case. Ensure the forward gear toward inside.



4. Install the drum shaft. Ensure the shift sensor toward inside.
5. Use caution when installing the gear position indicator spring and pin located in the end of the drum shaft.
6. Insert shift fork into main shaft dog and drum then install fork shaft.

6. Place flat washer on output shaft bearing.
7. Install the output shaft.

8. Install the transmission cover then fasten all bolts to 12Nm.



Transmission cover Bolt Torque:
12 Nm (8.8 ft. lbs.)

9. Install the drum detent and shift teeth. Ensure all dots must on center position.

10. Install detent bolt and fasten to 10Nm.

11. Check transmission operation before final assembly, and after installing outer cover.

FORWARD	
NEUTRAL	
REVERSE	

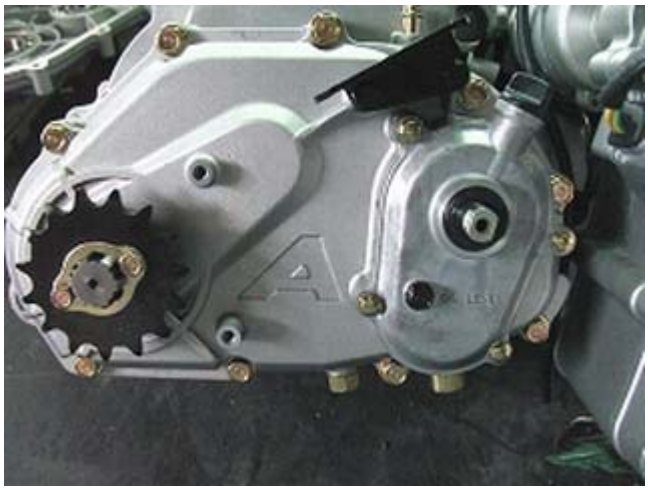
11. Install detent ball, spring, o-ring and bolt.

12. Install the shift cover then fasten bolts to 10Nm.

13. Install shift cables to the bracket.

14. Install the drive sprocket and sprocket cover.

15.Fill



Transmission Trouble shooting

Gear Will Not Engage

• Shift arm indexed incorrectly

• Shift cables loosened

• Shift cables broken

• CVT Belt broken

• Internal trans gear damage

• Shift fork broken or bent

• Shift shaft broken

Pops Out Of Gear

• Shift arm indexed incorrectly

•Shift cables loosened

• Detent spring or ball missing, worn, or broken

• Gear engagement dogs worn (rounded) or broken

• Shift fork bent

Noise

• Incorrect transmission lubricant

• Lubricant level too low

• Lubricant level too high

• Bearings worn or damaged

• Gears worn or damaged

• CVT problem (belt)

• Final drive (chain or sprockets) worn or damaged

CHAPTER 6
FUEL/CARBURATOR

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⚠ WARNING

Gasoline is extremely flammable and explosive under certain conditions.

Always stop the engine and refuel outdoors or in a well ventilated area.

Do not overfill the tank. The tank is at full capacity when the fuel reaches the bottom of the filler neck. Leave room for expansion of fuel.

Never start the engine or let it run in an enclosed area. Gasoline powered engine exhaust fumes are poisonous and can cause loss of consciousness and death in a short time.

Never drain the float bowl when the engine is hot. Severe burns may result.

Do not smoke or allow open flames or sparks in or near the area where refueling is performed or where gasoline is stored.

If you get gasoline in your eyes or if you should swallow gasoline, seek medical attention immediately.

If you spill gasoline on your skin or clothing, immediately wash with soap and water and change clothing.

Carburetor Function

Carburetor Component Function

System	Main Components	Main Function	Main Affect
Float System Level Control)	Inlet Pipe, Needle and Seat, Float and Float Pin	Maintains specified fuel level in float chamber (carburetor float bowl).	All systems; all throttle ranges
Venting	Passages in carburetor and vent lines.	Supplies atmospheric pressure to float chamber.	All systems; all throttle ranges.
Starter (Choke Plate)	Choke Lever, Cable, and Choke Butterfly	Supplies additional fuel air mixture necessary for cold starting.	All throttle ranges. Greatest effect low throttle settings and idle.
Pilot Idle System)	Pilot Jet / Passageways, Pilot–Mixture Screw with Spring Washer and Sealing O–Ring, Pilot Outlet and Throttle Valve.	Primarily supplies fuel at idle and low throttle positions.	Mainly idle 1/4 throttle. Minimal effect after 1/2 throttle.
Main System	Main Jet, Main Air Passage, Needle Jet, Jet Needle, Throttle Valve.	Supplies fuel at mid–range and high throttle settings.	1/4 to full throttle.

Carburetion Specifications

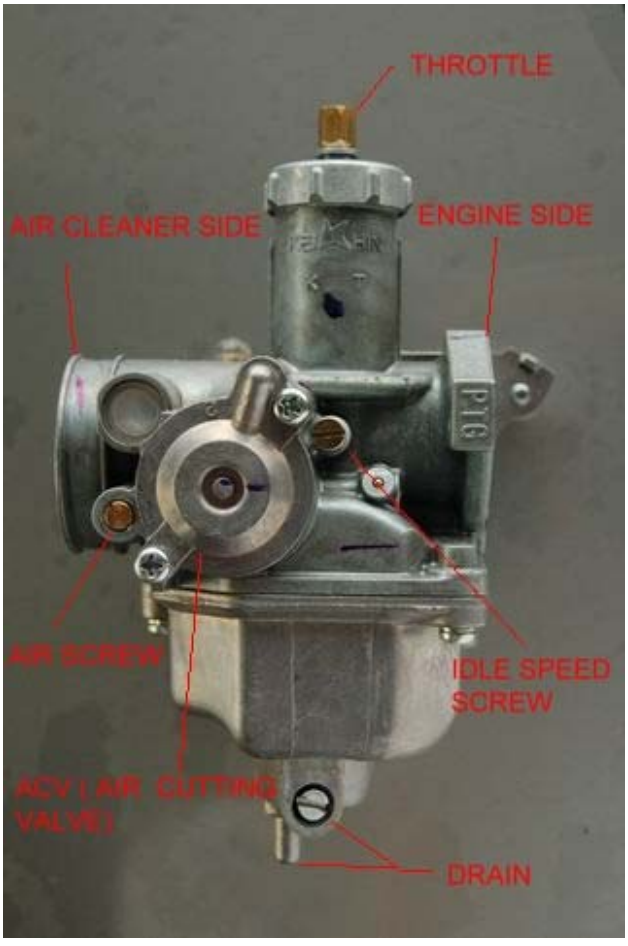
GOES 300 S KEIHIN	
Type	**PTG With ACV**
Air Screw	**1 Circuit**
Jet Needle	**2MKNN**
Slide Valve	**B34**
Pilot Jet	**#38S**
Main Jet	**#108**
E-clip Position	**4th From Top**

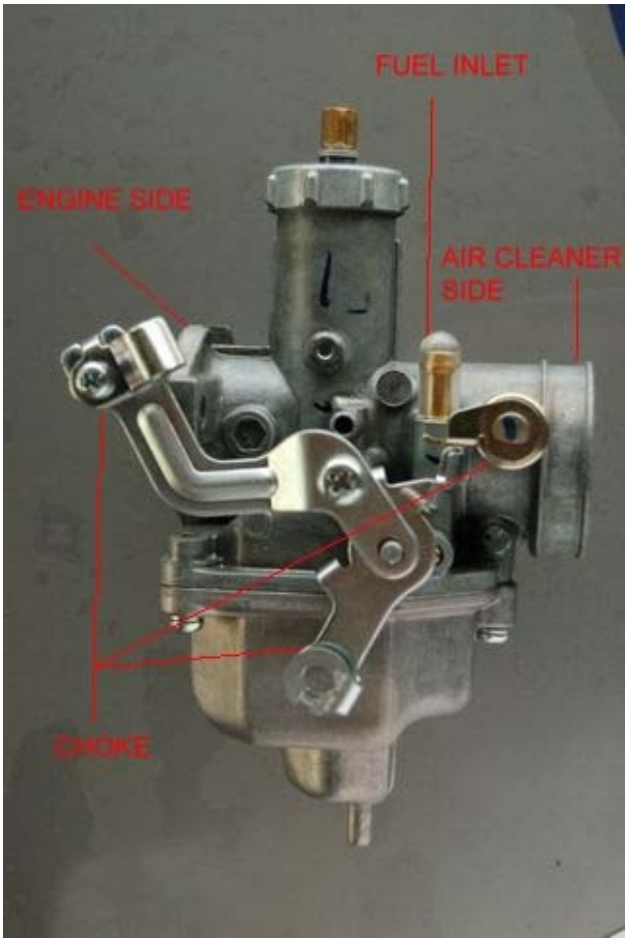
Operation Overview

The engine of a vehicle is operated under a wide range of conditions, from idling with the throttle valve remaining almost closed, to full load or maximum output with the throttle valve fully opened. In order to meet the requirements for the proper mixture ratio under these varying conditions, a low speed fuel system, or pilot system, and a main fuel system are provided in these type of carburetors.

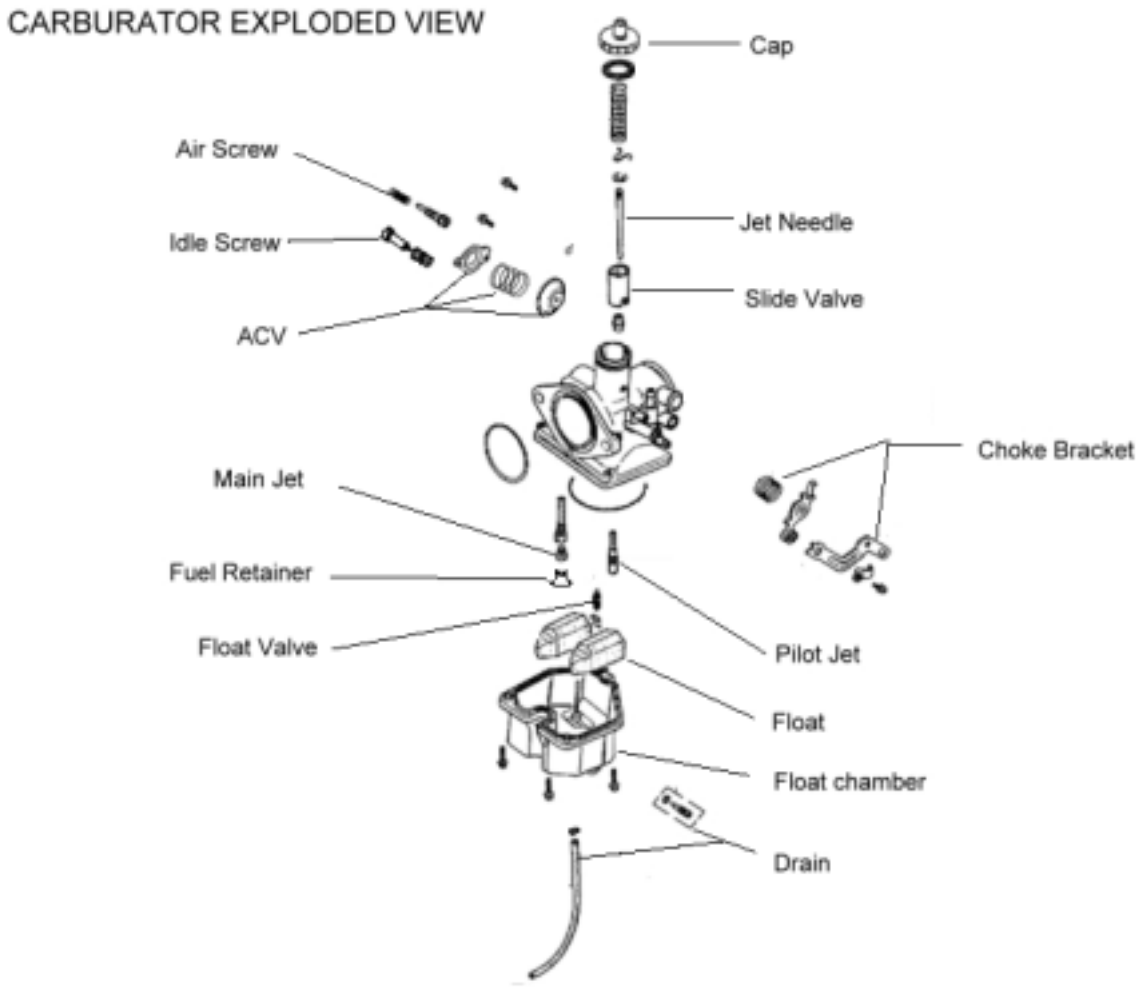
The function of a carburetor is to produce a combustible air/fuel mixture by breaking fuel into tiny particles in the form of vapor, to mix the fuel with air in a proper ratio, and to deliver the mixture to the engine. A proper ratio means an ideal air/fuel mixture which can burn without leaving an excess of fuel or air. Whether the proper mixture ratio is maintained or not is the key to efficient engine operation.

This carburetor has varying operations depending upon varying driving conditions. It is constructed of a float system, pilot system, main system, and starter system or initial starting device.





CARBURETOR OPERATION



NOTE: It is strongly recommended that Carbon Clean be added regularly as directed to the fuel systems. Carbon Clean stabilizes the fuel, preventing clogging of the small passages and orifices common to Youth ATV carburetors, and ensures constant performance, reliability and easier starting.

HIGH ALTITUDE OPERATION

The 2005 Phoenix has been tested to 12,000 ft above sea level to assure satisfactory performance. No jetting or clutching changes are required for high altitude operation. NOTE: If desired, removing one CVT roller weight from each tower of the drive clutch and fine--tuning the carburetor with optional jetting may provide a slight improvement in high altitude performance, but generally is not needed.

CARBURETOR JETTING

IMPORTANT: The following guidelines must be followed when establishing a main jet setting:

1. Select the lowest anticipated temperature at which the machine will be operated.
2. Determine the lowest approximate altitude at which the machine will be operated.
3. Select the correct main jet according to the engines fuel/performance requirements.

⚠ CAUTION

A main jet that is too small will cause a lean operating condition resulting in serious engine damage. Select the correct main jet carefully for elevation and temperature according to the charts in the Specifications section or in the Owner's Safety and Maintenance Manual for each particular model.

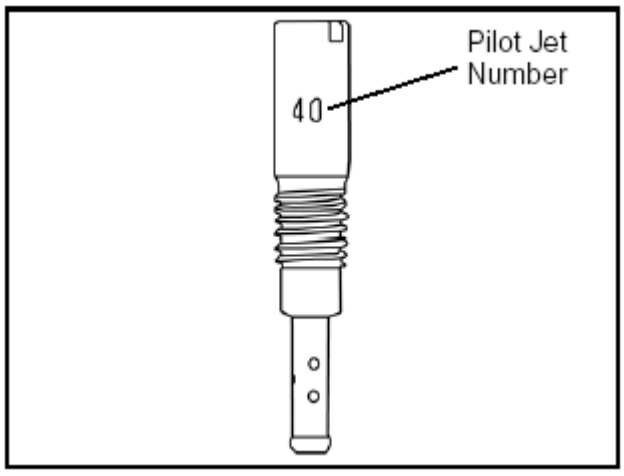
Float System

The float system is designed to maintain a constant height of gasoline during operation. When the fuel flowing from the fuel pump into the float chamber through the needle valve reaches the constant fuel level, the floats rise. When the buoyancy of the float and the fuel pressure of the fuel pump balance, the needle valve seals the orifice in the needle seat, preventing further fuel delivery, and the level of fuel in the bowl remains relatively constant.

The fuel level in the bowl assists in controlling the amount of fuel in the fuel mixture. Too high a level allows more fuel than necessary to leave the nozzle, enriching the mixture. Too low a level results in a leaner mixture, since not enough fuel leaves the nozzle. Therefore, the predetermined fuel level should not be changed arbitrarily.

Pilot Jet

From idling to low speeds, the fuel supply is metered by the pilot jet. There are several air bleed openings in the sides of the pilot jet which reduce the fuel to mist. The number stamped on the jet is an indication of the amount of fuel in cc's which passes through the jet during a one minute interval under a given set of conditions.

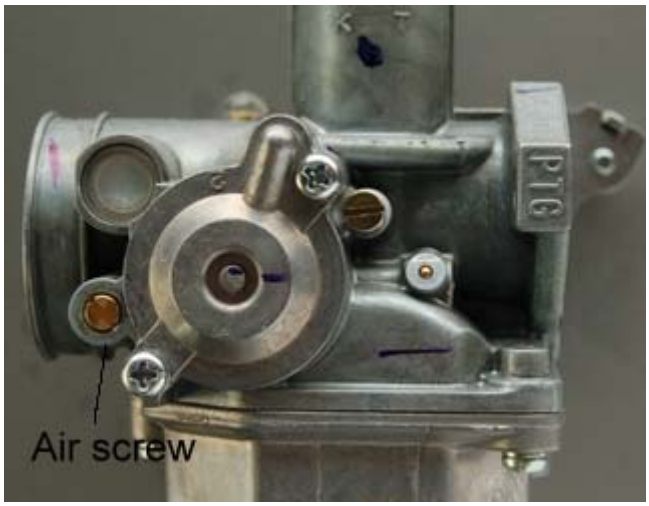


Air Mixture Screw

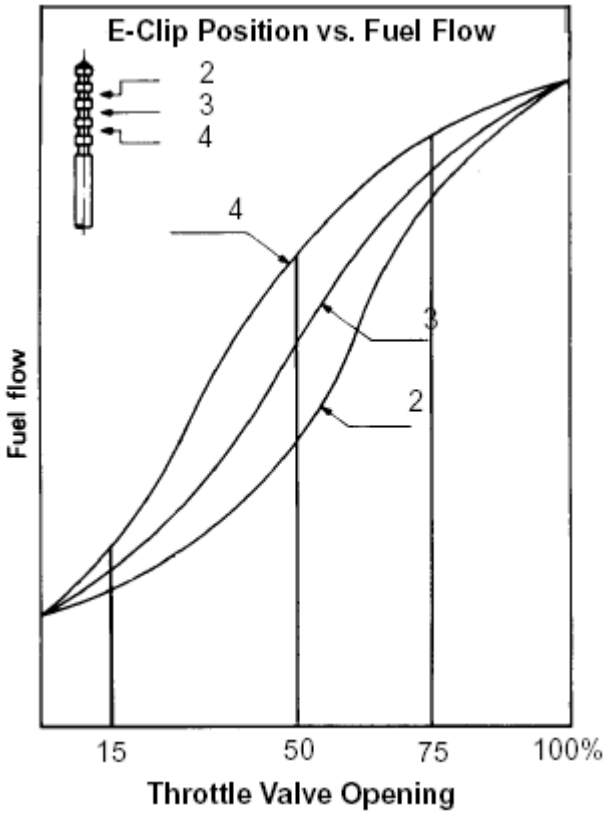
The pilot mixture screw controls the fuel mixture from idle to low speeds. The tapered tip of the mixture screw projects into the fuel mixture passage leading to the pilot jet air bleeds. By turning the screw in or out, the cross sectional area of the air passage is varied, in turn varying the pilot jet air supply and changing the mixture ratio.

⚠ CAUTION

The airscrew is calibrated at the factory to meet EPA / CARB regulations for air quality standards. Cleaning of the pilot circuit must be performed by a certified repair shop to ensure air quality standards are not exceeded.



Air / Fuel Mixture Ratio

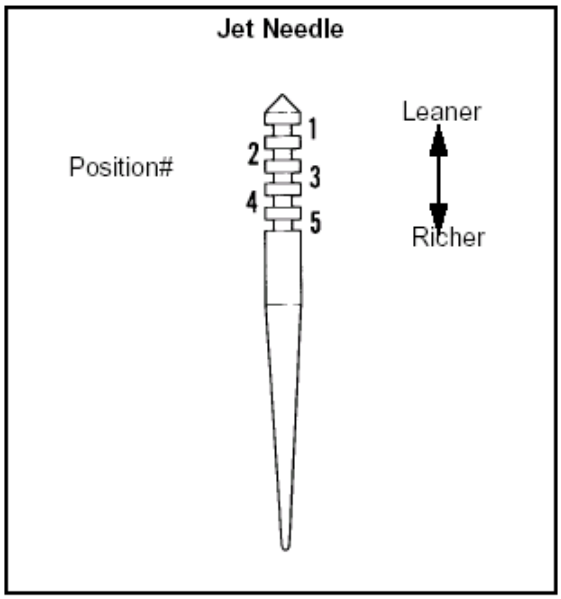


A carburetor with a slide type throttle valve is also called a variable venturi type carburetor. In this type of carburetor, the needle jet and jet needle serve to control proper air/fuel mixture ratio at the medium throttle valve opening (between 1/4 and 3/4 opening).

Having the proper needle jet and jet needle has a major impact on engine performance at partial load. The jet needle tapers off at one end and the clearance between the jet needle and the needle jet increases as the throttle valve opening gets wider. The air/fuel mixture ratio is controlled by the height of the "E" clip inserted into one of the five slots provided in the head of the jet needle. The previous chart shows the variation of fuel flow based on the height of the "E" clip.

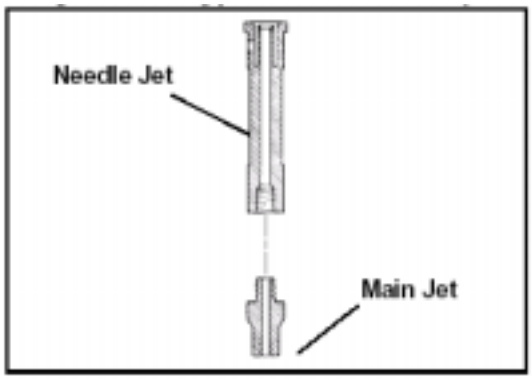
Jet Needle

The jet needle has five adjustment grooves cut into the upper portion, and is tapered from approximately the middle of the needle to the lower end. The top is fixed to the center of the throttle valve by the needle clip, and the tapered end extends into the needle jet. Fuel flows through the space between the needle jet and jet needle. This space does not vary until the throttle reaches the 1/4 open point. At that time the tapered portion of the needle begins to move out of the jet, affecting fuel flow as the opening enlarges. If the needle clip is changed from the standard position to a lower groove, the needle taper starts coming out of the jet sooner, resulting in a richer mixture. Moving the clip higher produces a leaner mixture. If the taper is worn due to vibration, fuel flow may be significantly affected.



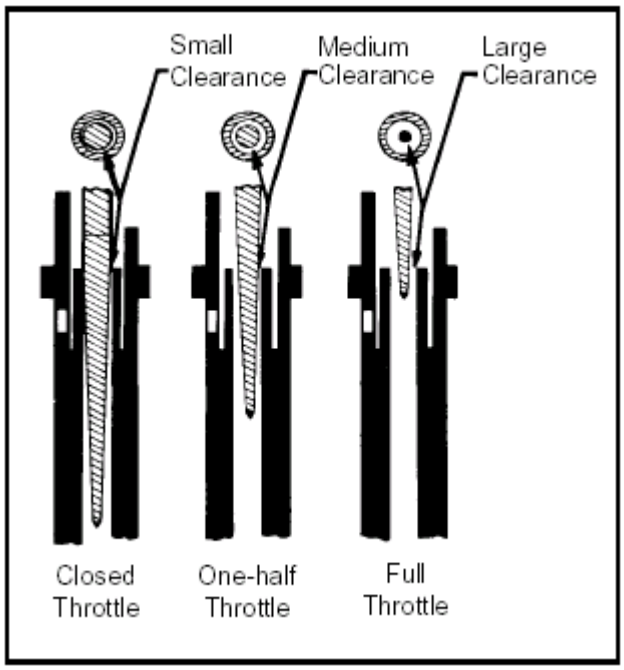
Needle Jet

The needle jet works in conjunction with the jet needle to regulate fuel flow rate. An air bleed opening in the side of the needle jet brings in air measured by the air jet. This air initiates the mixing and atomizing process inside the needle jet.



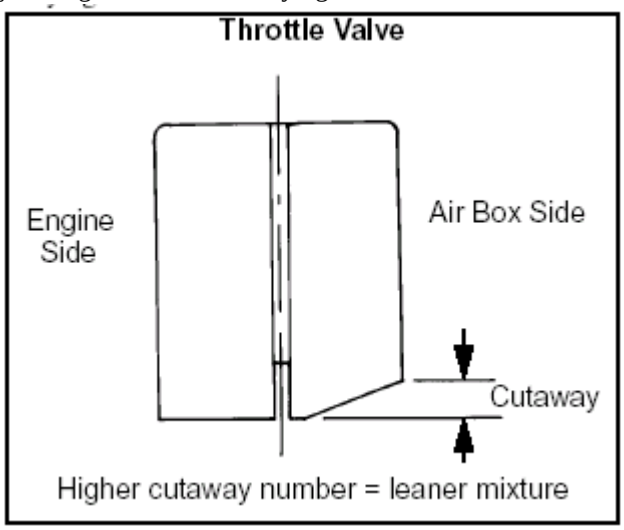
Throttle Opening vs. Fuel Flow

In a full throttle condition the cross sectioned area between the jet needle and the needle jet is larger than the cross sectioned area of the main jet. The main jet therefore has greater control over fuel flow.



Throttle slide

The throttle slide controls the rate of engine air intake by moving up and down inside the main bore. At small throttle openings, air flow control is performed chiefly by the cutaway. By controlling air flow the negative pressure over the needle jet is regulated, in turn varying the fuel flow.

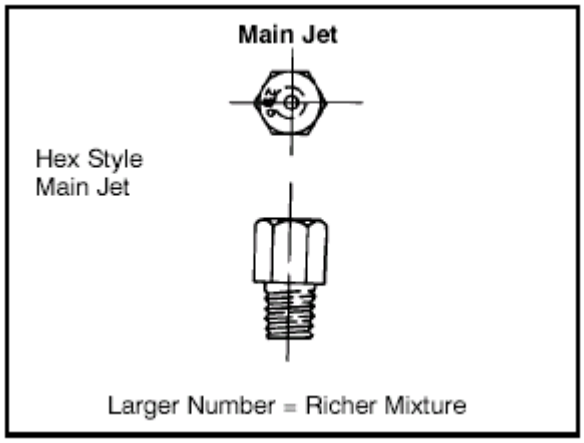


Throttle valves are numbered 1.0, 1.5, 2.0, etc., according to the size of the cutaway. The higher the number, the leaner the gasoline/air mixture.

Main Jet

When the throttle opening becomes greater and the area between the needle jet and jet needle increases, fuel flow is metered by the main jet. The number on the jet indicates the amount of fuel

CCs which will pass through it in one minute under controlled conditions. Larger numbers give a greater flow, resulting in a richer mixture.



Main jets are screwed directly into the needle jet base.

Pilot System (Idle - 3/8 Throttle)

The pilot system's main function is to meter fuel at idle and low speed driving. Though its main function is to supply fuel at low speed, it does feed fuel continuously throughout the entire operating range.

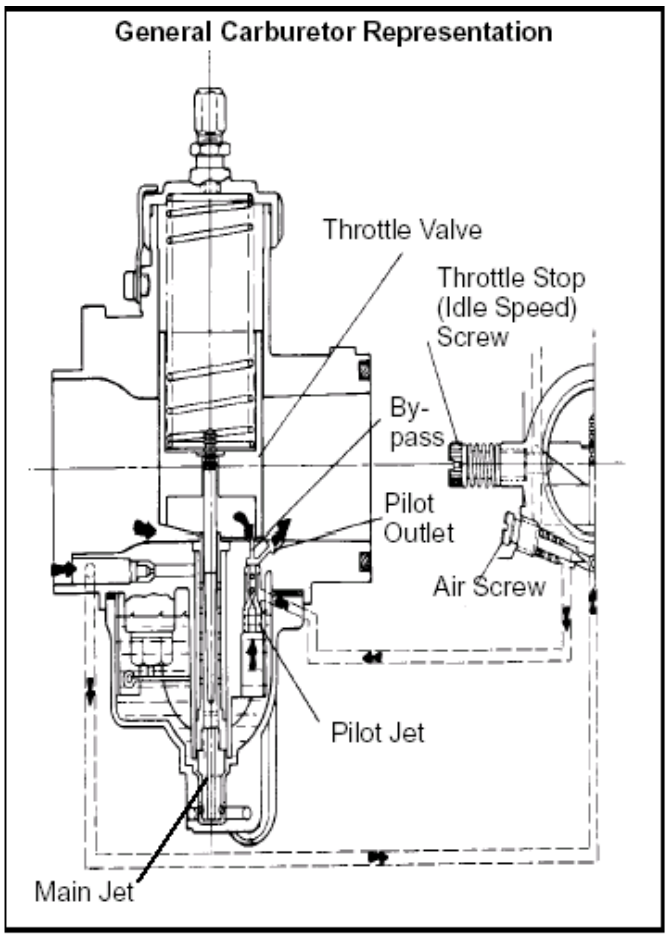
Fuel for the pilot jet is drawn from the float bowl, mixed with air regulated by the air screw, and delivered to the engine through the pilot outlet.

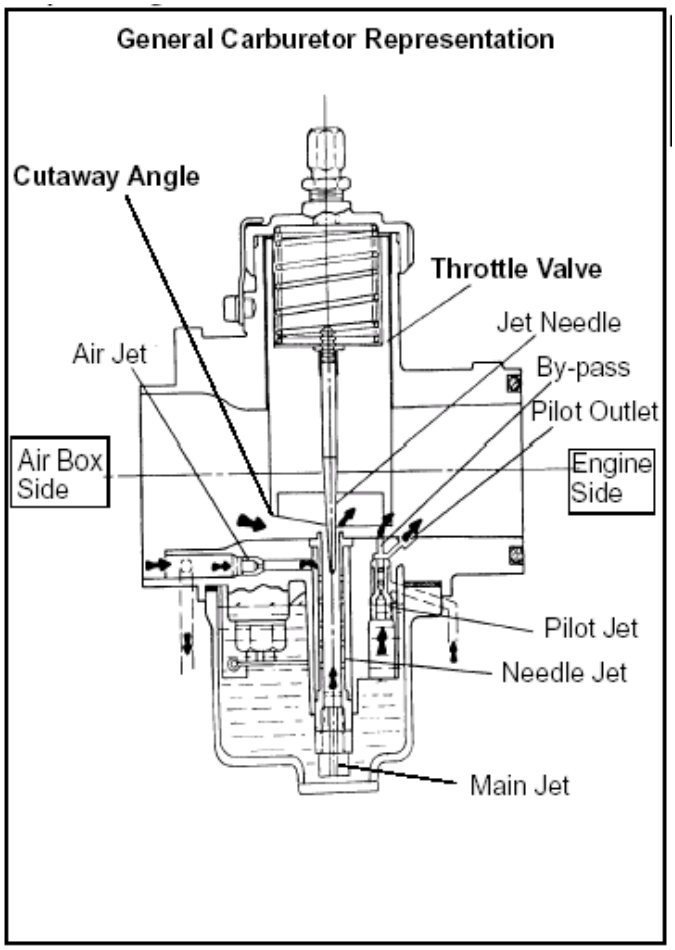
The mixture is regulated to some degree by adjusting the air screw. When the air screw is closed, the fuel mixture is made richer as the amount of air is reduced. When the air screw is opened, the mixture is made more lean as the amount of air is Increased.

Slide Cutaway (1/8 - 3/8 Throttle)

Throttle valve cutaway effect is most noticeable at 1/4 throttle opening. The amount of cutaway is pre-determined for a given engine to maintain a 14:1 air/fuel ratio at part throttle. A steep angle would indicate a fairly lean mixture because there is less resistance to air flow. A flat angle would provide a much richer mixture because there is more resistance to air flow.

The venturi shape can be adjusted for each engine's breathing characteristics by using a different valve cutaway angle. A number will be stamped into the bottom of the valve (e.g. 2.5) indicating the size of the cutaway. The higher the number, the steeper the angle.





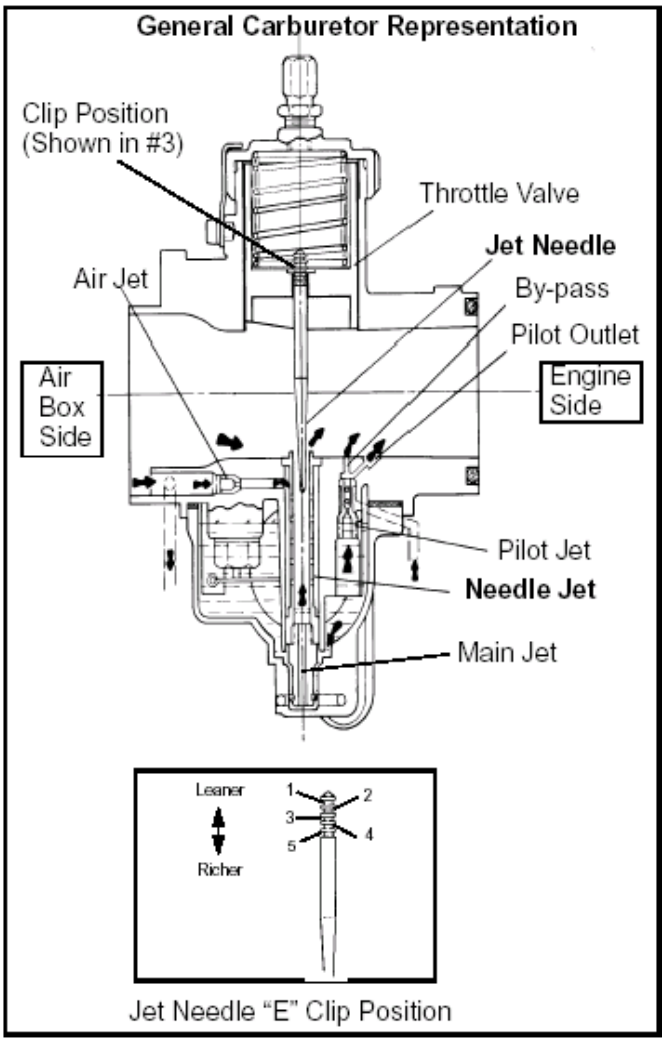
Jet Needle / Needle Jet (3/8 - 3/4 Throttle)

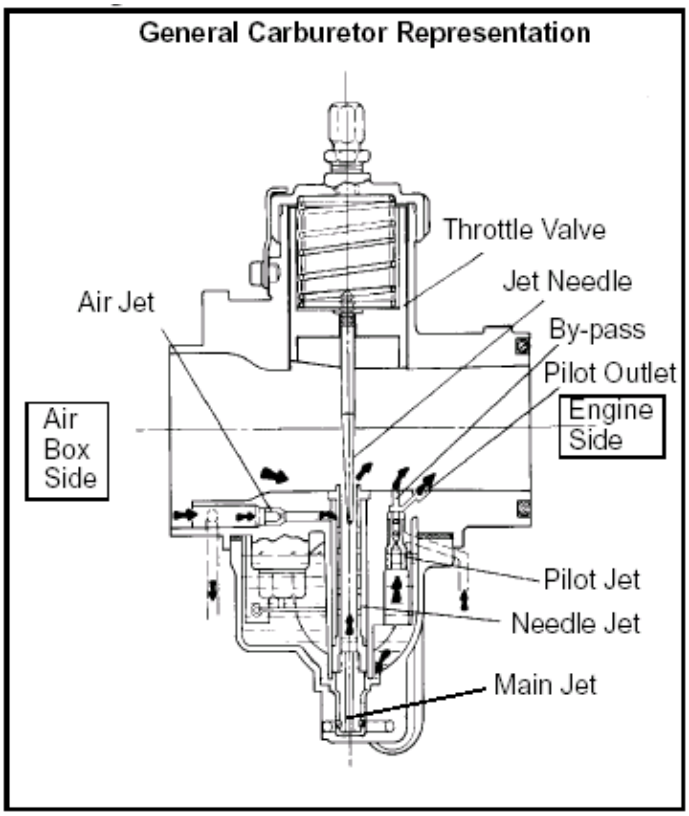
The jet needle and needle jet have the most effect between 3/8 and 3/4 throttle opening. Some mixture adjustment can be accomplished by changing the location of the “E” clip on the needle. Moving the clip down raises the needle in the jet passage and richens the mixture. Moving the clip up lowers the needle in the jet passage and leans the mixture. Letter and number codes are stamped into the needle and the jet indicating sizes and tapers of each.

Main System (3/4 to Full Throttle)

The main system is designed for delivering fuel between low speed and high speed operation. This system is made up of the jet needle, needle jet, and main jet. The main system begins to take effect as soon as there is enough air flow into the carburetor venturi to draw fuel up through the main jet and needle jet assembly. This system works in conjunction with the needle jet system.

During low speed driving, there is very little clearance between the jet needle and the needle jet; therefore, very little fuel from the main jet can pass between the jet needle and the needle jet. As the throttle valve opening is increased, the tapered jet needle is raised farther out of the needle jet, allowing greater fuel flow. Under full throttle opening, the cross sectioned area of clearance between the jet needle and the needle jet becomes greater than the cross sectioned area of the main jet. Thus the main jet is now controlling the amount of fuel flow.

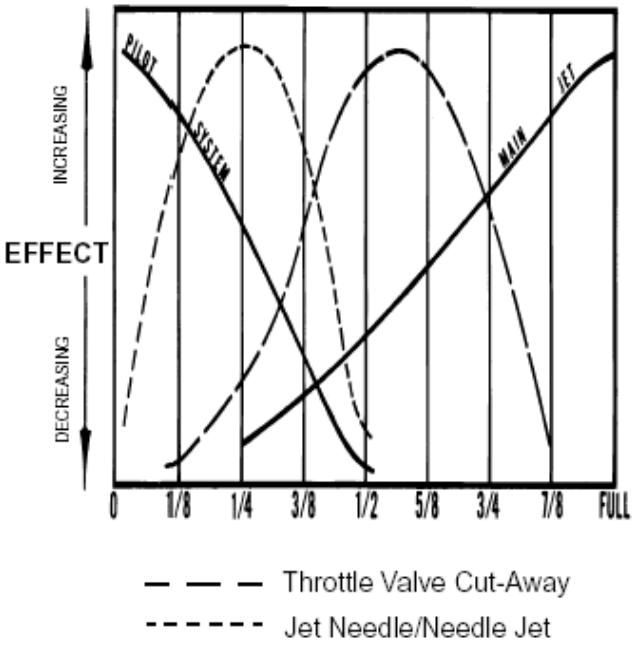




Fuel Delivery

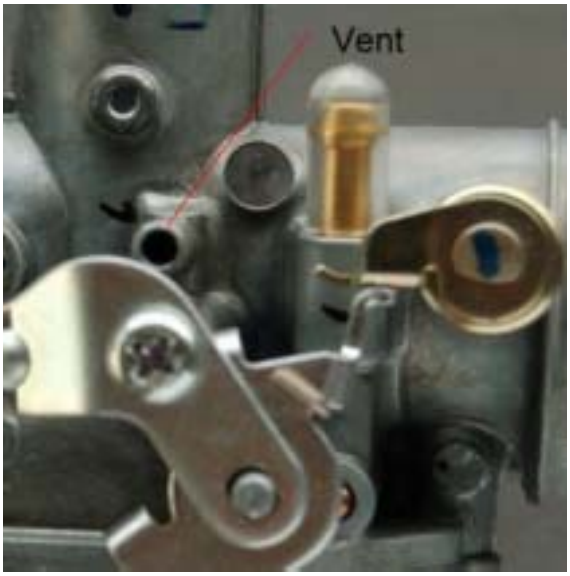
The throttle opening chart below demonstrates component relationship to fuel flow versus throttle valve opening.
The pilot system's main function is that of a low speed jet. Its most effective range of fuel delivery is from idle to approximately 3/8 throttle valve opening.
The throttle slide controls the rate of engine air by its movement up and down in the carburetor venturi. At small throttle openings the air flow is regulated chiefly by the valve cutaway, with greatest effectiveness at 1/4 throttle opening. Throttle valves are numbered 1.0, 1.5, 2.0, etc., according to the size of the cutaway.
Decreasing the cutaway number will increase the amount of fuel delivered in its effective range.
The jet needle and needle jet have an effective operating range from approximately 1/8 to 7/8 throttle opening. The amount of fuel delivered during this range relies upon the jet needle clip position, as well as the needle jet size and other specifications.
The main jet affects fuel delivery at 1/4 throttle and consistently increases to full throttle opening.

THROTTLE OPENING - Theory



VENT SYSTEM

The fuel tank vent supplies atmospheric pressure to the fuel in the tank. The vent must be free of debris and restrictions to prevent lean mixture and possible engine damage. All vent linesmust be properly routed to prevent damage to the line and to prevent contaminants from entering the tank.



⚠ WARNING

Protect eyes from contact with cleaner. Take appropriate safety measures during these procedures. Safety glasses and chemical resistant gloves are required. Should you get cleaner in your eyes or if you swallow cleaner, seek medical attention immediately.

CARBURETOR CLEANING

Carburetor cleaners can be extremely caustic. Extended periods of soaking can loosen the adhesive sealer on the passage drill-way plugs. *Do not* soak rubber or plastic components (such as the vacuum slide diaphragm, needle seat screen, or O-Rings in caustic cleaning solutions. Irreparable damage may occur. Do not use agitator--type carburetor cleaning equipment. Rubber parts must be cleaned with mild detergent and hot water only.

1. Thoroughly clean the carburetor body, jets, and all passages with carburetor cleaner or electrical contact cleaner.

2. If the carburetor is extremely dirty or contaminated with fuel residue and varnish, soak for short periods only in carburetor cleaner, and rinse in hot water.
3. Replace the jets if they have a buildup of fuel residue or bacterial growth that cannot be removed. Even a small amount of residue will reduce the flow characteristics of the jet.
4. Verify all passages and jets are unobstructed by spraying electrical contact cleaner through the passages.

⚠ CAUTION
Do not use wire or welding tip cleaners as the orifice size may be altered.

5. Use low-pressure air to dry carburetor body and all components.

Carburetor Removal - General

The following procedure is provided to use as a reference when removing the carburetor from vehicle. Some steps may differ slightly between models.

1. Remove the seat.
2. Loosen air cleaner box bolts.

3. Bend and tie up fuel intake hose then drain the fuel from the carb through the drain screw.
4. Loosen the intake boot clamp between the carburetor and air cleaner.
5. Open the carb cap then disconnect the throttle cable end from.

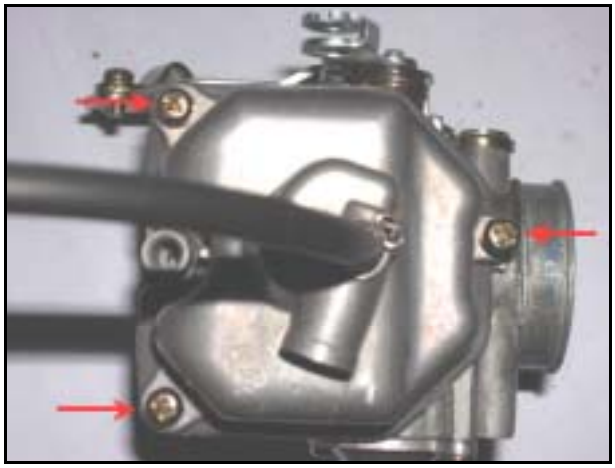
6. Disconnect the choke cable end from the choke lever.
7. Remove fuel tube and vent tube.
8. Loosen manifold intake nuts.

9. Remove carburetor from ATV.

Carburetor Disassembly

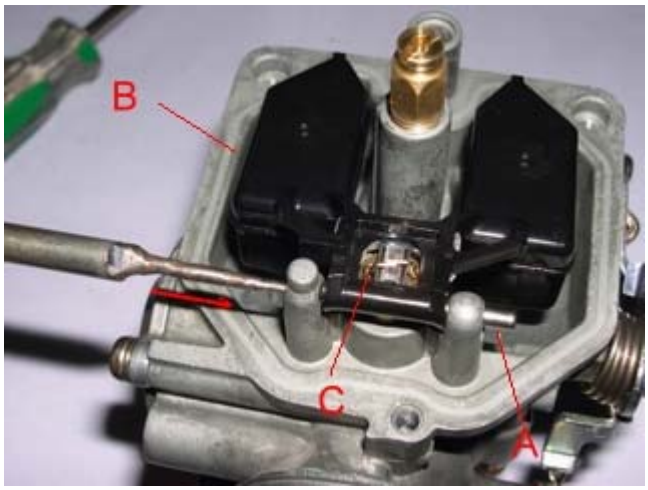
Use the following procedure to disassemble the carburetor.

1. Remove the (3) float bowl screws and float bowl.



2. Remove fuel retainer.

3. Remove the float pin (A) , float (B) , and inlet needle (C).



4. Remove the pilot jet , main jet , and from the carb body.

5. Note the position of both the air mixture screw and idle speed adjustment screw and remove both from the carb body.

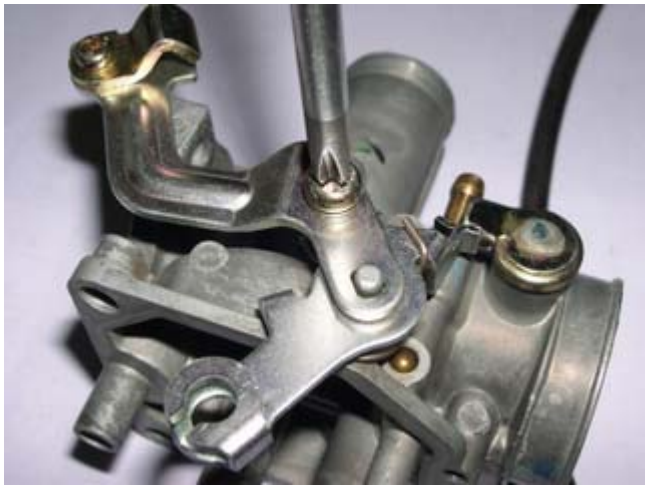
Throttle Valve and Choke Disassembly

1. Loosen the valve cap.

2. Remove cable with valve from the carb body.

3. disconnect throttle cable from slide valve.

4. Remove choke screw and bracket.



5. Remove the choke arm.

⚠ CAUTION

Spring pressure can cause components to eject suddenly. Use care during removal.

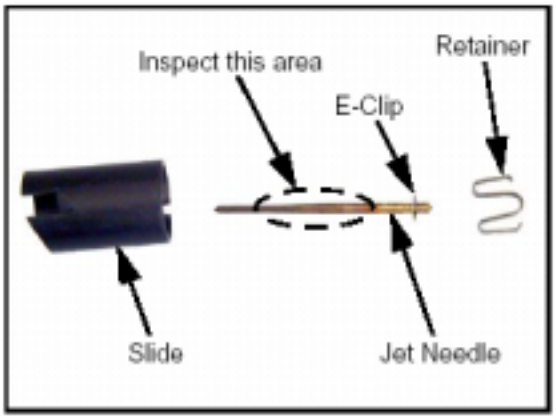
6. Remove the choke spring .

Air Cutting Valve disassembly

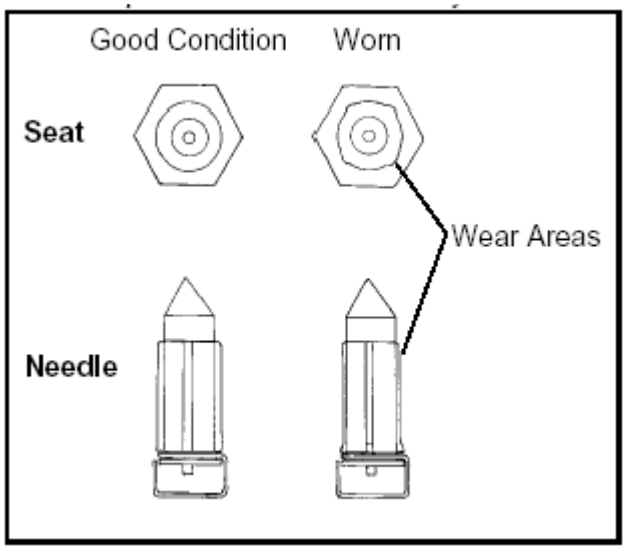
1. Remove air cutting valve cover and diaphragm.

Carburetor Inspection

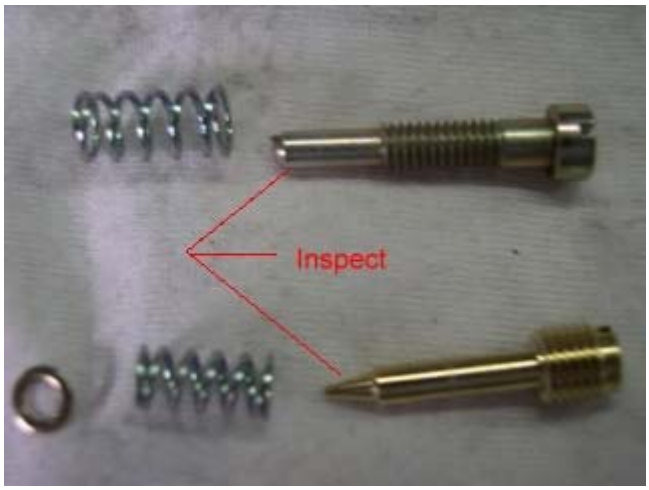
1. Inspect jet needle and needle jet for wear. Look for discoloration, shiny spots, or an area that looks different than the rest of the needle. The middle to upper portion of the needle contacts the needle jet and is the most likely wear point. If jet needle shows signs of wear replace *both the needle and needle jet* to prevent a rich condition.
TIP: A worn *needle jet* is difficult to spot. To check, slide a slightly larger *new jet needle* into the needle jet and hold it to a light source. Light will be visible between the needle and needle jet if it is worn.



2. Inspect the inlet needle tapered surface for any sign of wear or damage. Be sure the spring loaded pin is free moving and returns freely when pushed. The inlet needle and seat should be pressure tested after assembly.



3. Inspect the idle speed adjust screw tip for flat spots and the pilot mixture screw tip for damage. If any damage is present on either screw, it must be replaced.

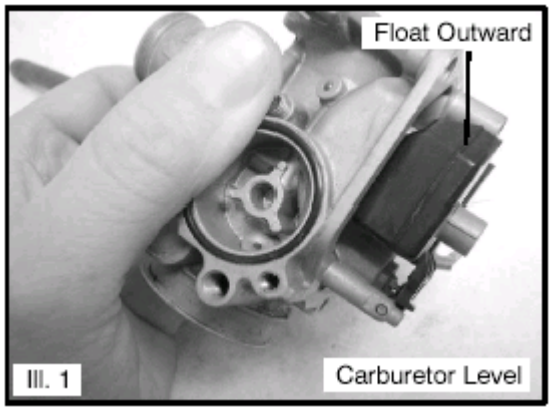


4. Inspect the float bowl vent tube for cracks near the bottom of the tube.

NOTE: A continuous fuel leak from the carburetor drain hose can be a result of a cracked bowl vent tube.

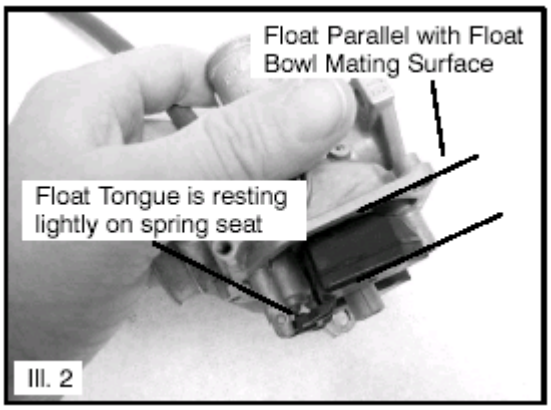
Float Height Adjustment

1. **Illustration 1**: Place the the throttle side of the carburetor at a level position to remove weight from float arm. In this position, the float tongue will rest slightly outward.



2. **Illustration 2**: With the carburetor at rest and level, slightly tilt the carburetor back. *The float should fall into the correct position, with the float tongue resting lightly on the inlet needle valve pin without compressing the spring*. The bottom of the float should be parallel with the float bowl mating surface.

NOTE: If the float is past parallel with the mating surface, the carburetor has likely been tilted back too far and the float tongue is compressing the needle valve pin.



3. Measure the height from the float bowl mating surface to the top of step of the float as shown in Illustration 2. Both sides of float should be parallel to each other. Themeasurement should bemade at the mid-point on top of the float using Float Adjustment Tool or a caliper. When measuring the height, verify the inlet needle valve spring is not compressed.

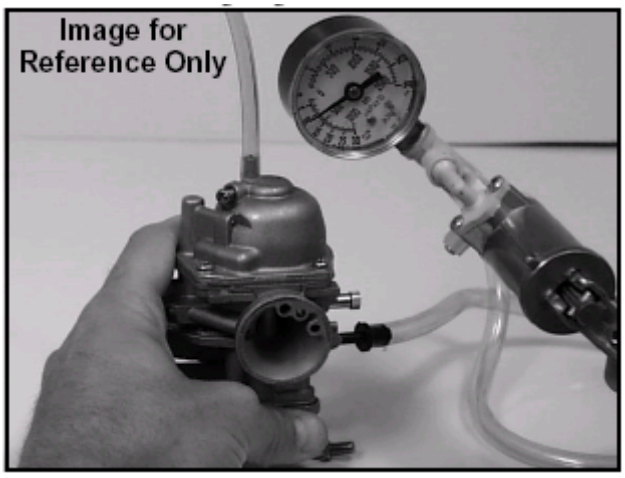
Float Height:
Parallel to Gasket Surface ± 1mm

Needle and Seat Leak Test

1. Install the float bowl.

2. Invert the carburetor and install a Mity-Vac™ to the fuel inlet fitting.

3. Apply 5 PSI pressure to inlet fitting. The needle and seat should hold pressure indefinitely. If not, inspect needle and seat and seat O-ring or gasket.



Carburetor Assembly

1. Replace parts in proper order. Refer to the parts exploded view or “Disassembly” steps for further detail

2. Install the pilot air mixture screw, spring, washer, and Oring as an assembly (Mikuni Only). Lubricate the O-Ring with oil or light grease before installation. Turn the screw in until it lightly contacts the seat. Back out the specified number of turns.

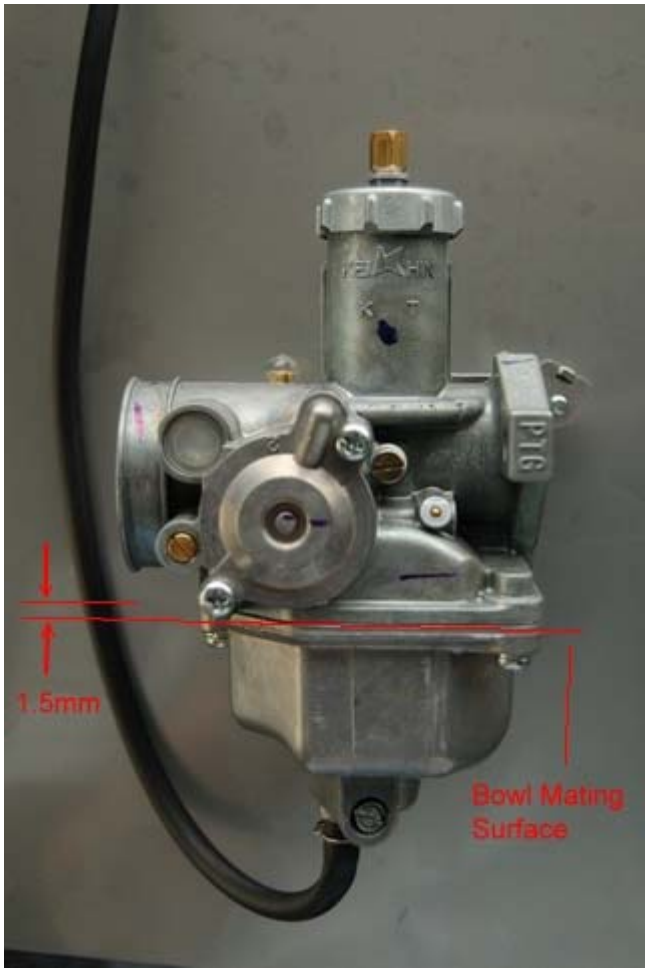
NOTE: The final air mixture screw must be adjusted with the engine running.

Air Screw Base Setting
(Set at Factory)
Factory Specification:
1 Turns Out

FUEL LEVEL TEST

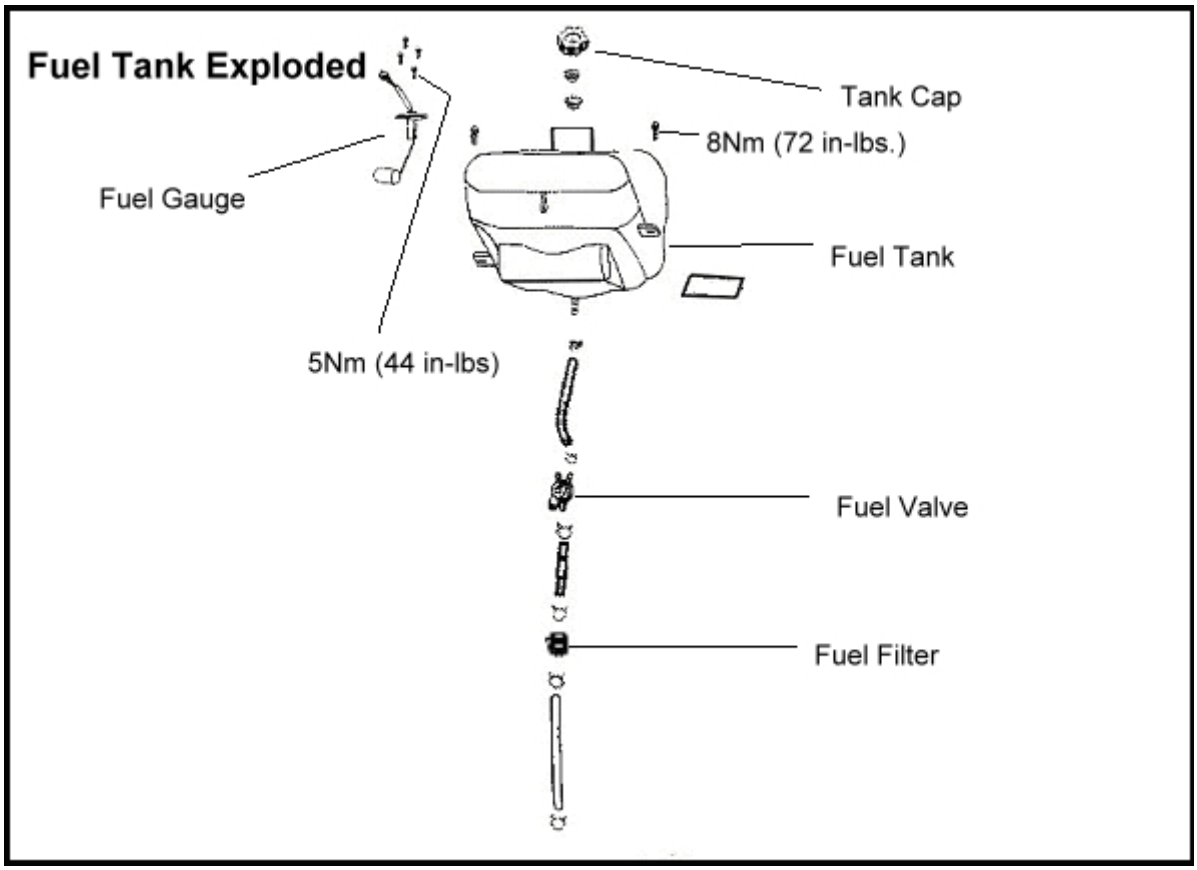
A fuel level test can be performed on some models if the drain hose fitting is accessible. Be sure to re-attach the bowl drain hose after performing the test. A fuel level test allows you to observe the height of the fuel in the float bowl without removing the carburetor. The fuel level can be observed with the engine either running or shut off, however, engine must run briefly to allow fuel level to stabilize..

1. Attach a clear line to drain fitting. Be sure line fits tightly on fitting. Position hose along side of carburetor as shown.



2. Open bowl drain screw by turning counterclockwise approximately two turns. Start and run engine for 3 to 5 seconds to allow fuel level to stabilize in the line. If level is out of specification, remove carburetor and inspect inlet needle and seat, float height, passages, etc.

NOTE: If a line was removed to perform this procedure, it must be replaced.



Fuel tank location

Fuel Tank Removal

1. Completely drain fuel from fuel tank. Be sure the fuel.
2. Remove the two bolts that attach the fuel tank to the frame.

3. Carefully lift up on the fuel tank.

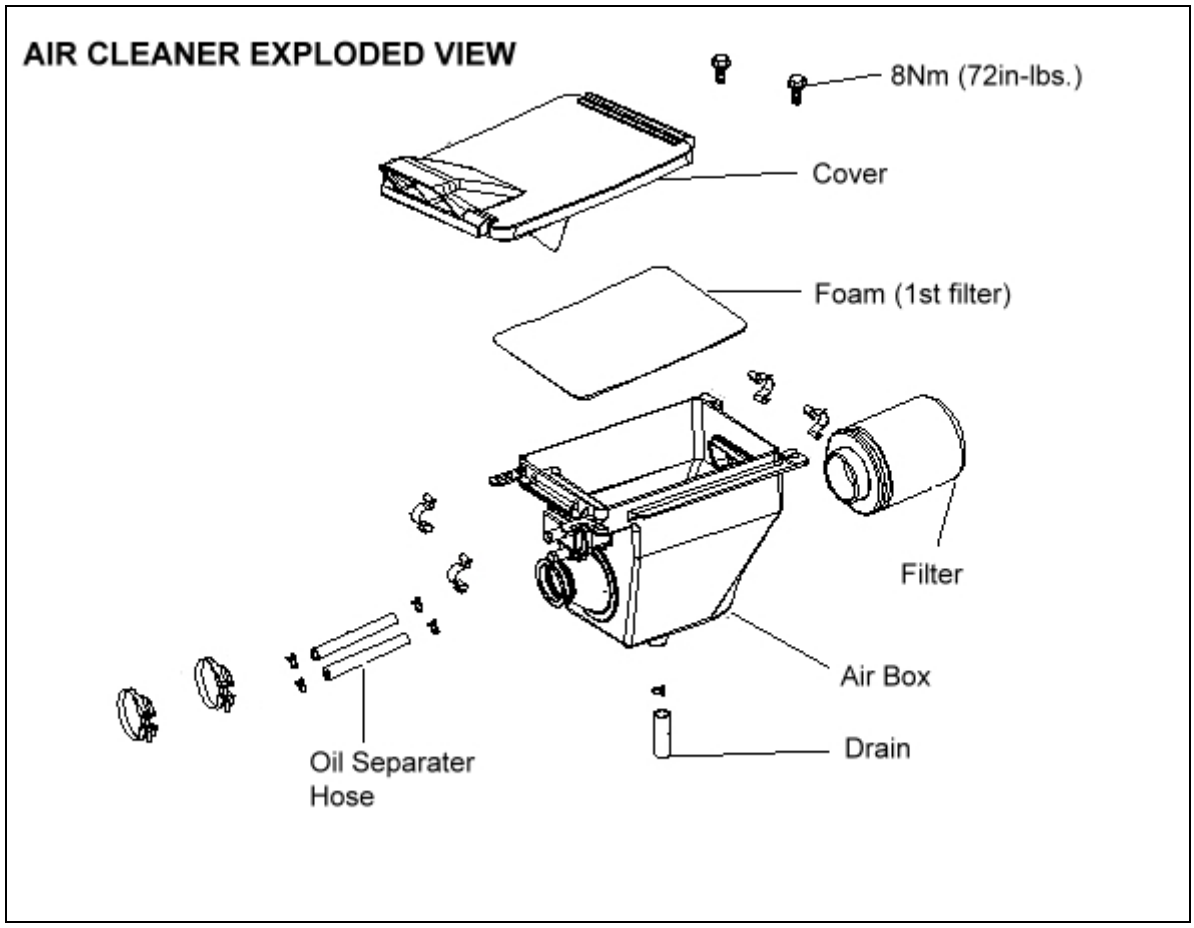
4. Remove fuel valve from frame.

5. Disconnect the fuel lever gauge harness.

6. Place a shop rag or towel underneath the tank and remove fuel line, fuel valve and filter from the tank.

7. Disconnect the fuel tube from tank.
8. To reinstall the tank, reverse the removal procedure. Be sure to torque the tank mounting bolts.

Fuel Tank Mounting Bolt Torque
8 Nm (72 in. lbs.)



Air Cleaner Removal

1. Release the screw and remove the cover.

2. Remove the foam air filter. Wash the foam filter in warm soapy water, then rinse and let it dry. If the filter is damaged, install a new foam filter.

3. Loosen the intake boot clamp between the carburetor and air cleaner.

4. Loosen oil separator hoses then remove air cleaner box.

5. Apply commercially available foam filter oil to the foam filter.

6. Reinstall the foam filter, foam and air box cover. Secure the clips.

CAUTION
The air intake on cover must toward front of vehicle.

TROUBLESHOOTING

Fuel Starvation / Lean Mixture

Symptoms: Hard start or no start, bog, backfire, popping through intake / exhaust, hesitation, detonation, low power, spark plug erosion, engine runs hot, surging, high idle, idle speed erratic.

• No fuel in tank
• Restricted tank vent, or routed improperly
• Fuel lines or fuel valve restricted
• Fuel filter plugged
• Carburetor vent line(s) restricted
• Plugged or restricted inlet needle and seat screen or inlet passage
• Clogged jets or passages
• Float stuck, holding inlet needle closed or inlet needle stuck
• Float level too low
• Intake air leak (throttle shaft, intake ducts, airbox or air cleaner cover)
• Jet needle position incorrect
• Incorrect pilot screw adjustment

Rich Mixture

Symptoms: Fouls spark plugs, black, sooty exhaust smoke, rough idle, poor fuel economy, engine runs rough/ misses, poor performance, bog, engine loads up, backfire.

• Air intake restricted (inspect intake duct)
• Air filter dirty / plugged
• Choke plate sticking, incorrectly adjusted choke
• Choke cable binding or improperly routed
• Incorrect pilot air / fuel screw adjustment
• Faulty inlet needle and seat
• Faulty inlet needle seat O-Ring
• Float level too high
• Poor fuel quality (old fuel)
• Loose jets
• Worn jet needle / needle jet or other carburetor parts
• Dirty carburetor (air bleed passages or jets)
• Weak or damaged choke plate return spring
• Fouled spark plug

Poor Idle

Idle Too High

• Idle adjusted improperly / air mixture screw damaged
• Throttle cable sticking, improperly adjusted, routed incorrectly
• Choke cable sticking, improperly adjusted, routed incorrectly
• Plugged or restricted pilot jet

Idle Too Low

• Choke cable bending or incorrectly adjusted
• Idle speed set incorrectly
• Air mixture screw misadjusted or damaged
• Belt dragging
• Ignition timing incorrect
• Worn jet needle / needle jet
• Plugged or restricted pilot jet

Erratic Idle

• Choke cable bending or incorrectly adjusted
• Throttle cable incorrectly adjusted
• Air leaks, dirty carburetor passages (pilot circuit)
• Pilot mixture screw damaged or adjusted incorrectly
• Tight valves
• Ignition timing incorrect
• Belt dragging
• Dirty air cleaner
• Engine worn
• Spark plug fouled
• Idle speed set incorrectly
• Worn jet needle / needle jet
• Plugged or restricted pilot jet

CHAPTER 7

BODY / SUSPENSION / STEERING

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GENERAL INFORMATION

Torque Specifications

Fastener	Torque
Suspension Fasteners	
A–Arm Attaching Bolt	42 Nm (31 ft. lbs.)
A-Arm Ball Joint Stud Nut	50 Nm (37 ft. lbs.)
Shock Mounting Bolts	Front: 44 Nm (33 ft. lbs.) Rear: 50 Nm (37 ft. lbs.)
Swing Arm Mounting Bolt	90 Nm (66 ft. lbs.)
Rear Axle Hub Bolt	35 Nm (26 ft.lbs.)
Steering Fasteners	
Handlebar Adjuster Block	10 Nm (84 in. lbs.)
Inner Tie Rod Bolts	19 Nm (14 ft. lbs.)
Outer Tie Rod Bolts	19 Nm (14 ft. lbs.)
Steering Post Mount Nuts	22 Nm (16 ft. lbs.)
Steering Post Nut	55 Nm (40 ft. lbs)
Final Drive Fasteners	
Front Wheel Spindle Nut	60 Nm (44 ft. lbs)
Rear Wheel Hub Nut	80 Nm (58 ft. lbs.)
Front / Rear Wheel Bolts	30 Nm (22 ft. lbs.)
Sprocket Bolts	Front: 9.8 Nm. (87 in. lbs.) Rear: 22 Nm (16 ft. lbs.)
Chain Tensioner Bolt	10 Nm (84 in. lbs.)
Bearing Carrier Mounting Bolts	55 Nm (40 ft. lbs.)
Chain Guard Bolts	22 Nm (16 ft. lbs)

BODY REMOVAL

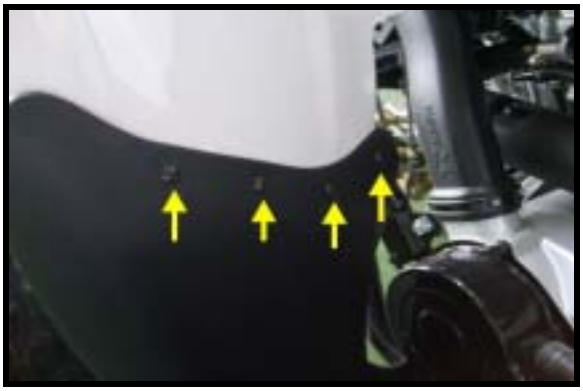
Front Cab Removal

1. Pull out the seat latch on tail and remove the seat.
2. Remove the 4 screws and the fuel tank cover.

3. Remove the 2 screws and 4 insert rivets from 2 side panels.
4. Remove 2 side panels from front and rear cabs.

5. Remove the 2 bolts attaching the body to the footwells on each side.
6. Remove radiator wind shield bolts on each side.

7. Remove the 8 screws attaching front and rear cabs to the footwells on each side.



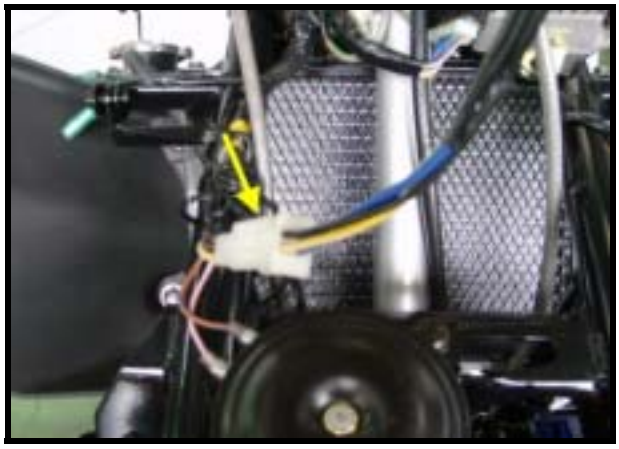
8. Remove the 2 bolts attaching the body to the front cab on each side.

9. Disconnect the main switch (ignition) harness.

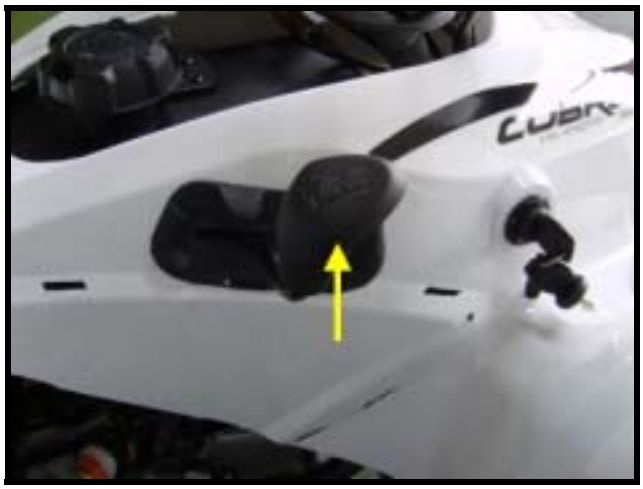
10. Disconnect power supplier wires.

11. Disconnect both front indicator plugs.

12. Disconnect the headlight harness.



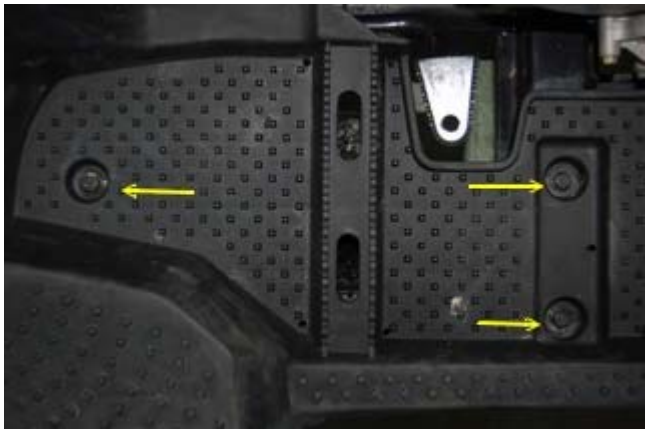
13. Remove shift lever grip.



14. Completely remove the front cab from body.

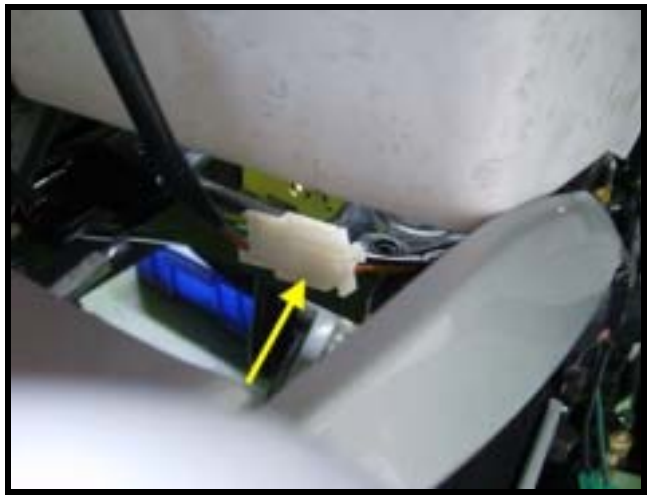
Rear Cab Removal

1. Remove 2 footwells from body.

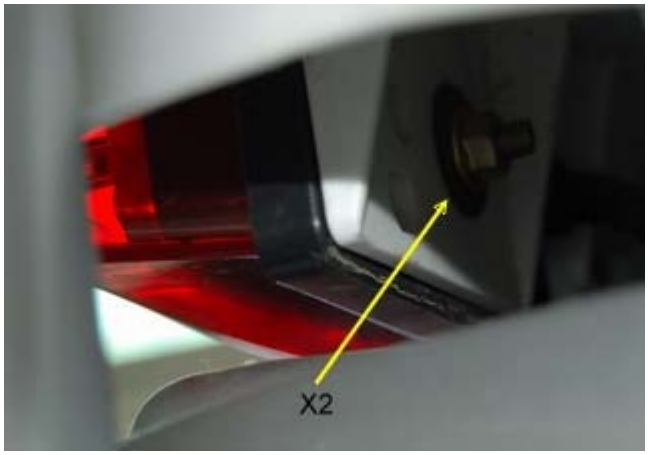


2. Remove the 4 bolts of rear cab.

3. Disconnect the taillight harness.



4. Remove the 2 bolts attaching the rear cabs then take off taillight.



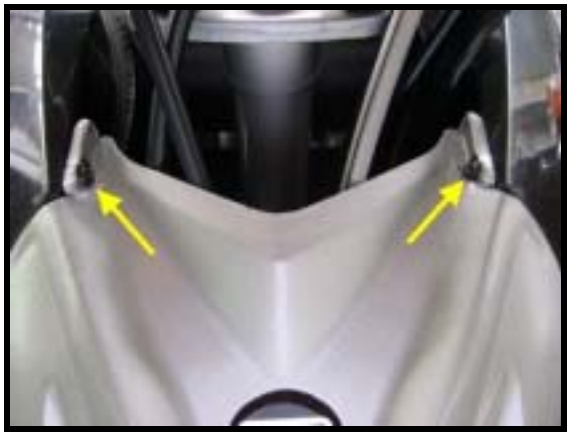
5. Cut off the straps of rear indicators then disconnects indicator plugs with main harness.

6.Remove Rear cab from cab.

Treetrentar 330 Headlight housing Removal

1.The front cab removal procedure same as Goes 300 S except headlight housing.

2. Remove the 2 upper bolts attaching on front cab.

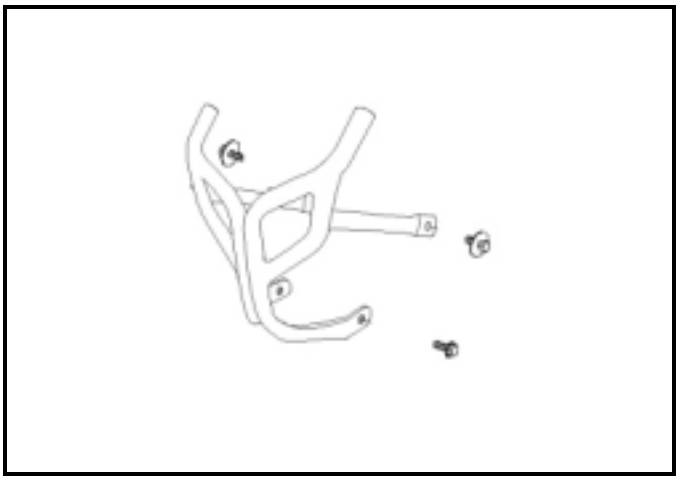


3. Remove the 2 bottom bolts attaching under front cab.

4. Completely remove the headlight housing from cab

Front Bumper Removal / Installation

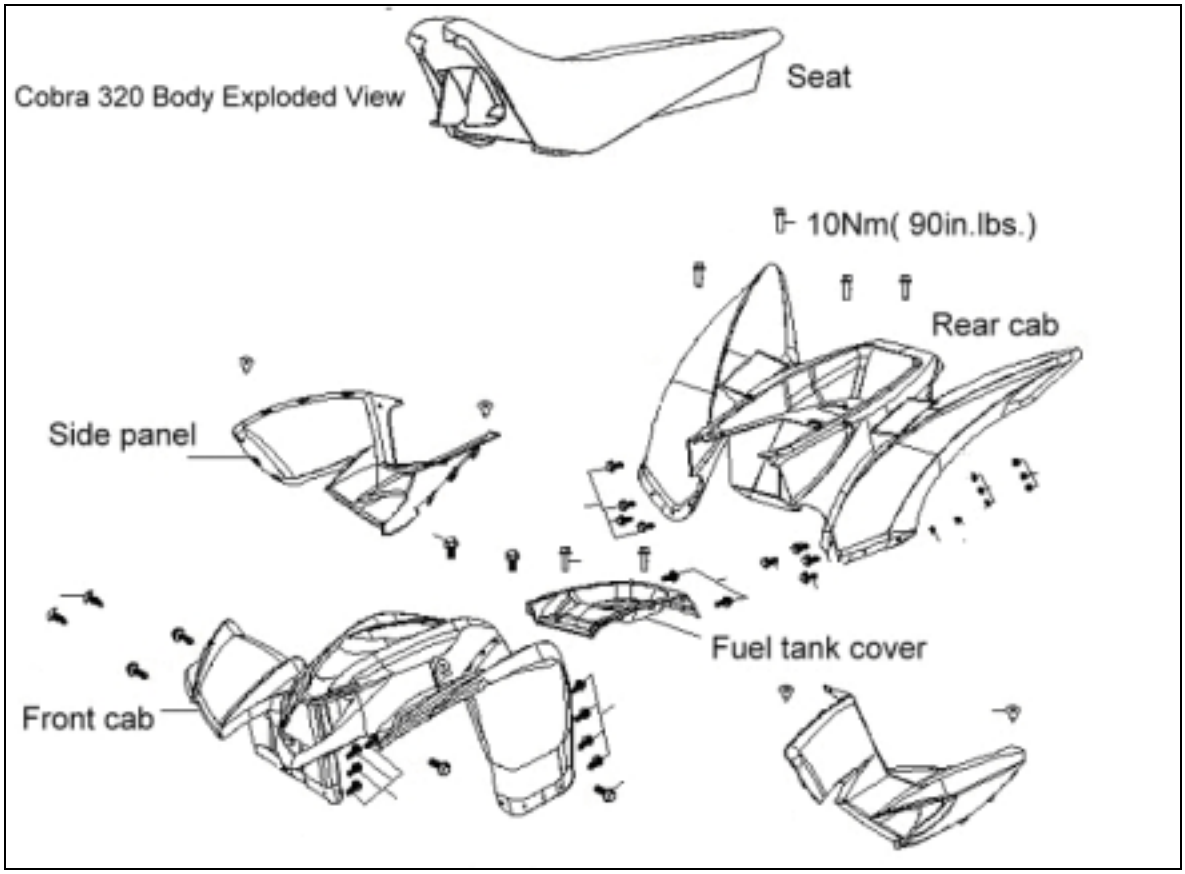
1. Remove the (4) mounting bolts retaining the front bumper and remove the bumper from the ATV.

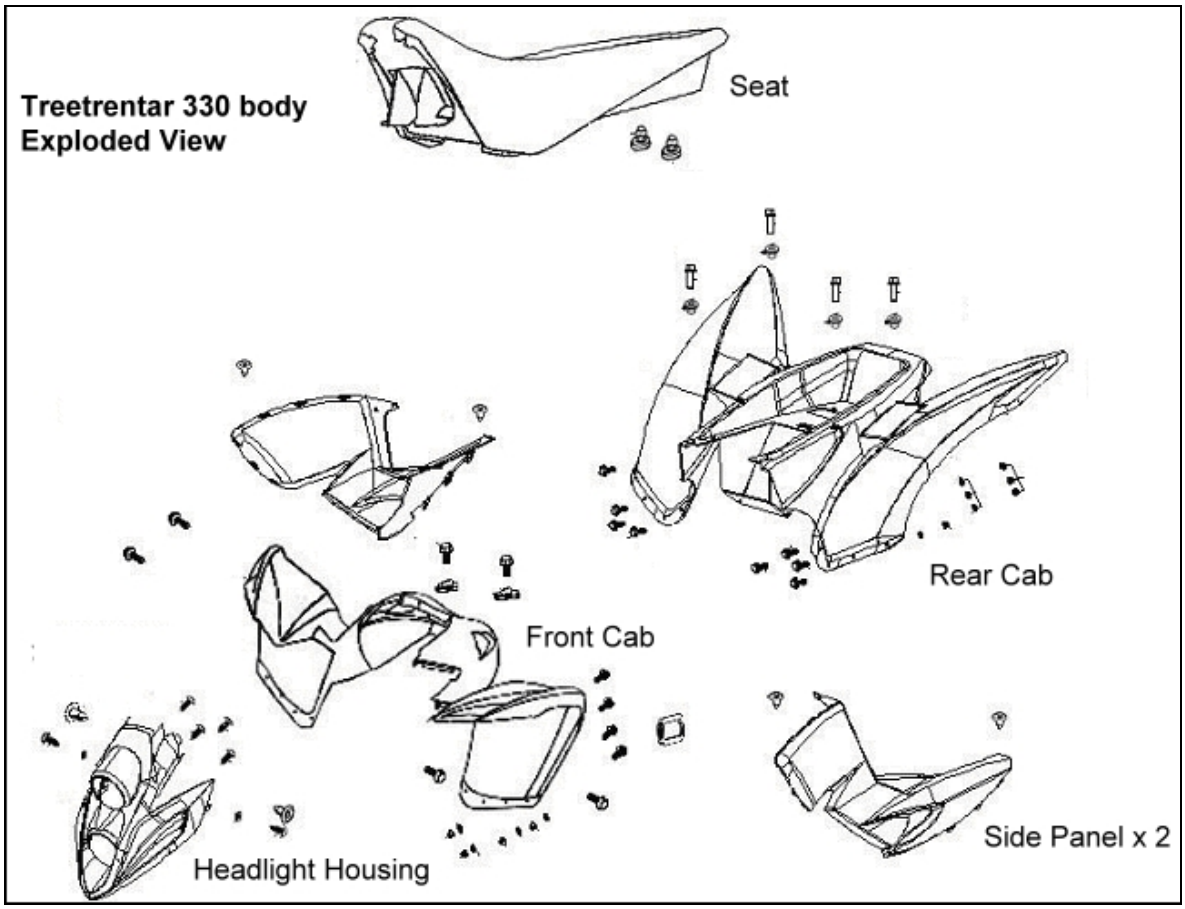


2. Reverse the previous procedure to reinstall the bumper.

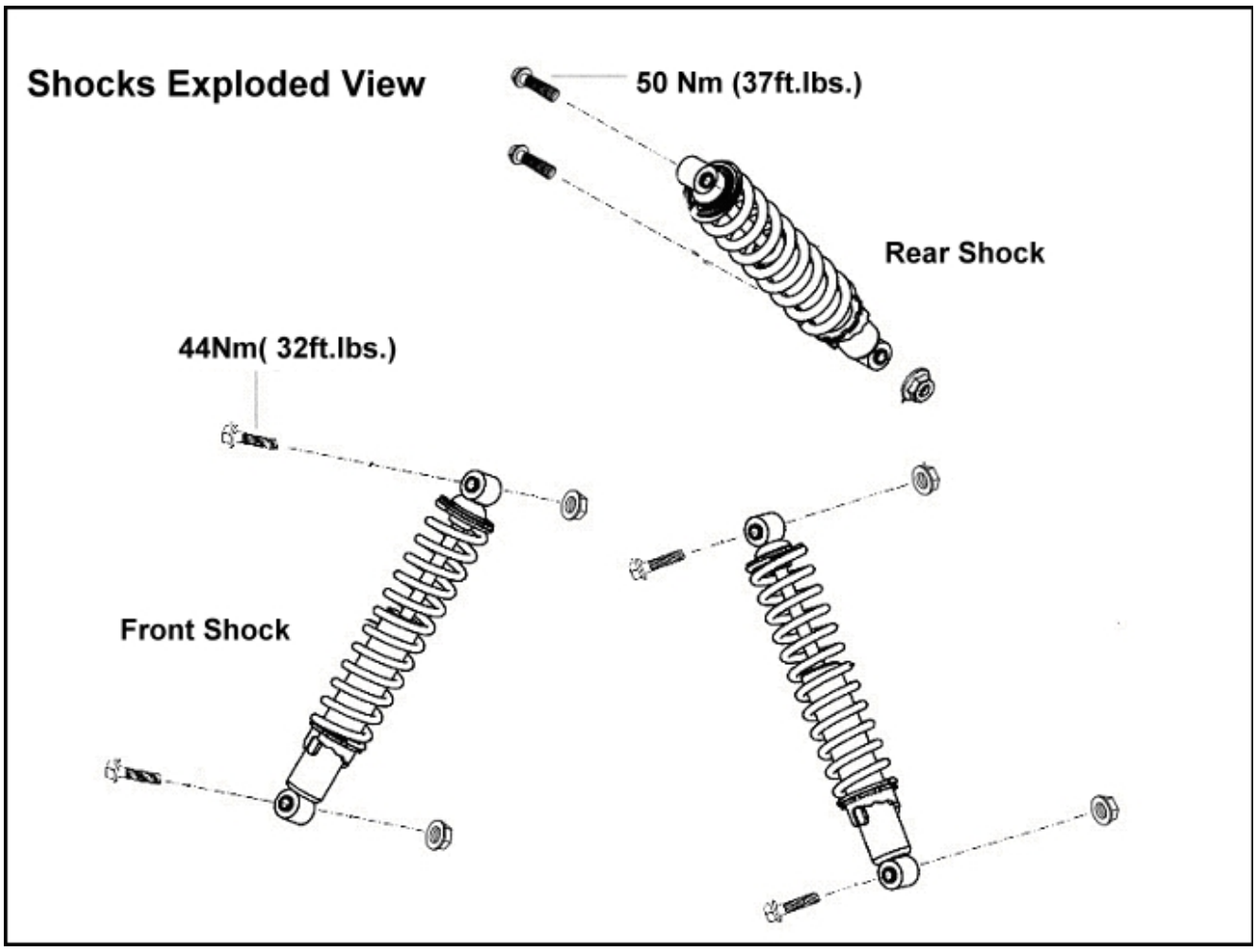
3. Torque mounting bolts to 87 in. lbs. (9.8 Nm).

Front Bumper Mount Bolt Torque
10 Nm (90 in. lbs.)


Cobra 320 Body Exploded View
Seat
10Nm(90in.lbs.)
Rear cab
Side panel
Fuel tank cover
Front cab


Treetrentar 330 body
Exploded View
Seat
Rear Cab
Front Cab
Side Panel x 2
Headlight Housing

SUSPENSION



Front Shock Removal

1. Elevate front end of the ATV off the ground to remove shock spring tension.

CAUTION

Severe injury could occur if machine tips or falls.

2. Remove the upper shock mounting bolts from the frame and the lower shock mounting bolts from the front suspension arm / A-arm.
3. Replace the shock or spring as required.
4. Install shock as shown above Exploded Figure.
5. Torque shock mounting bolts to specification.

= T

Front Shock Mounting Bolt Torque:
44 Nm (32 ft. lbs.)

Rear Shock Removal

1. Elevate rear end of the ATV off the ground to remove shock spring tension.

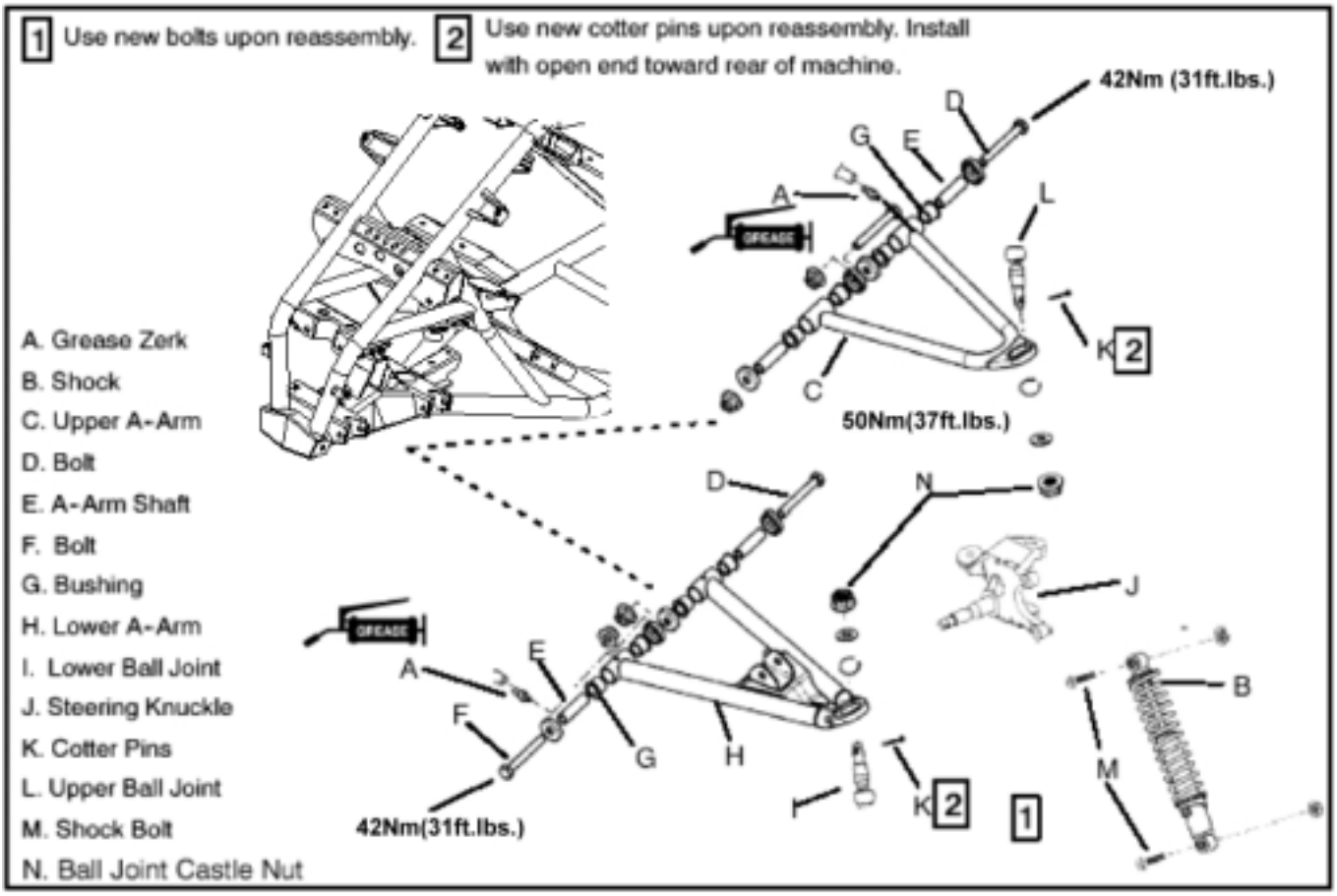
⚠ CAUTION
Severe injury could occur if machine tips or falls.

2. Remove the upper shock mounting bolt from the frame and the lower shock mounting bolt from the swing arm.

3. Replace the shock, spring or adjuster cam as required
4. Install the shock as shown above Exploded Figure.
5. Torque shock mounting bolts to specification.

= T
Rear Shock Mounting Bolt Torque: **50 Nm (37 ft. lbs.)**

FRONT A-ARM



A-arm Replacement

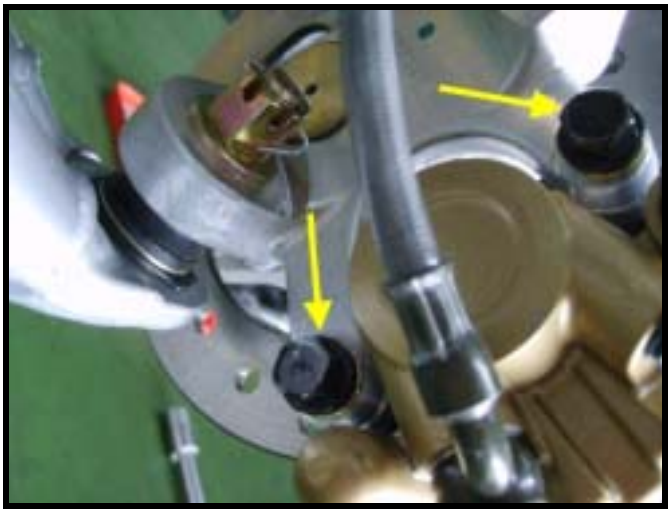
1. Elevate front end of ATV off the ground far enough to remove the wheel.

⚠ CAUTION

Severe injury could occur if machine tips or falls.

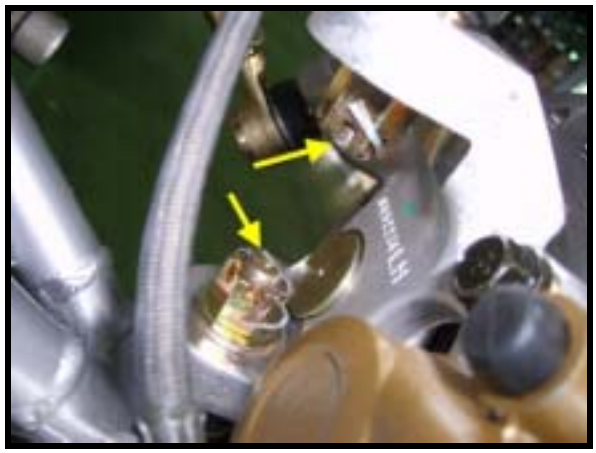
2. Remove wheel nuts and remove wheels.

3. Remove brake caliper bolts and caliper.



4. Remove wheel hub and brake disc.

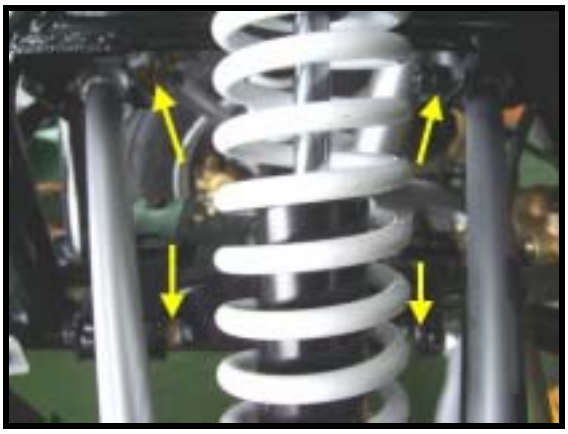
5. Remove the upper and lower ball joint cotter pins (K) from the ball joint studs (I & L) at wheel end of A-arm. Remove the ball joint nuts until the nuts are flush with end of the ball joints studs.



6. Push up on the upper A--arm (C) to remove the A--arm from the steering knuckle (J). Push down on the lower A—arm (H) to remove the A—arm from the steering knuckle (J).

7. Remove the lower shock bolt (M) from the lower A--arm and remove the shock from the A--arm.

8. Loosen two bolts on the A-arm tubes (D) (upper and lower A--arms) until A-arm can be removed.



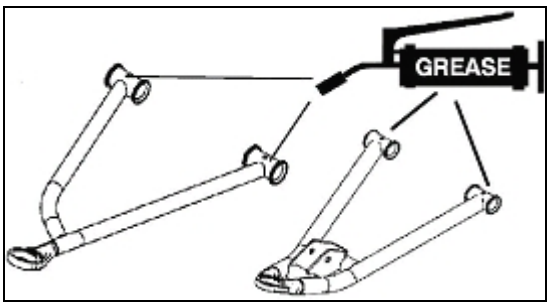
9. Examine the A-arm shafts (E). Replace if worn. Discard hardware.

10. Insert A-arm shaft (E) into the new A-arm(C & H).

11. Install new A-arm assembly onto vehicle frame (upper and lower). Torque bolts to **42Nm (30 ft. lbs.)**.

12. Attach upper A--arm (C) and lower A-arm (H) to steering knuckle (J). Tighten both ball joint nuts to **50 Nm (37 ft. lbs.)**. If cotter pin holes are not aligned, tighten nut slightly to align. Install a new cotter pin with open ends toward rear of machine (upper and lower). Bend both ends in opposite directions around nut.

13. Locate two grease fittings on each A-arm tube and pump A-arm ends full of grease.



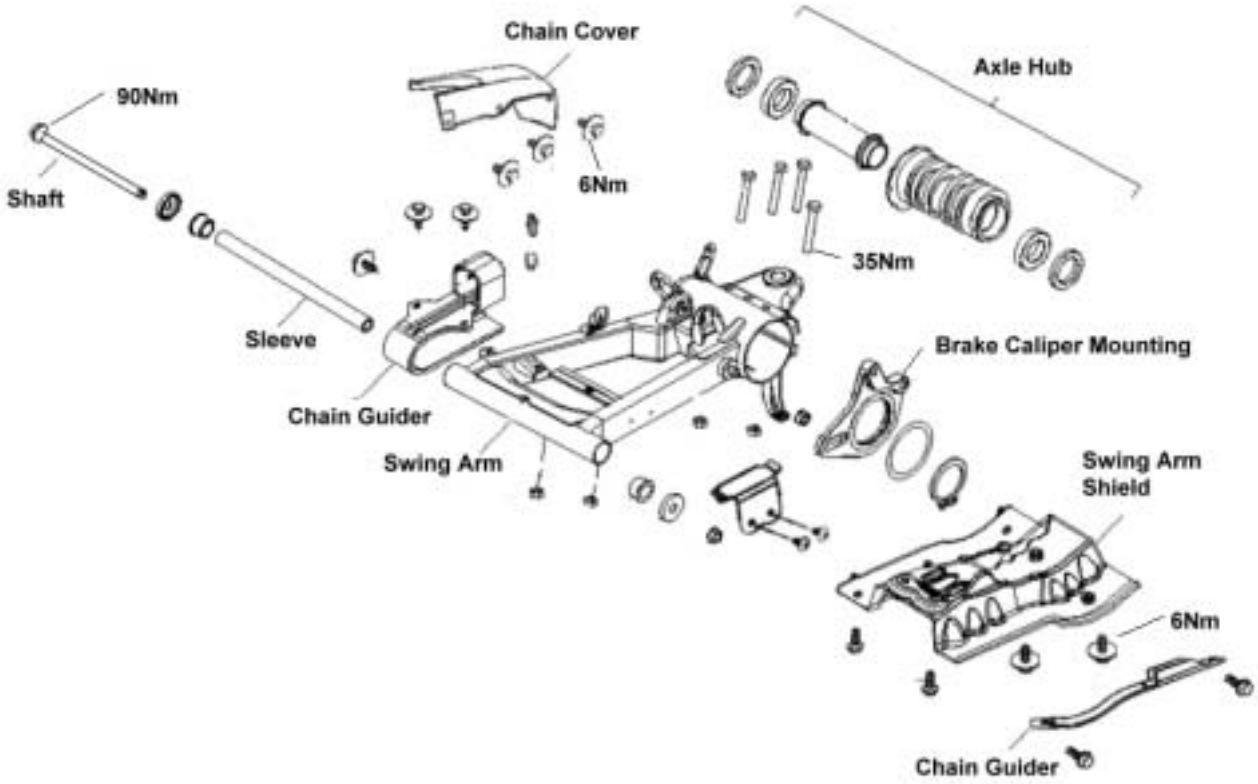
⚠ WARNING

Upon A-arm installation completion, test vehicle at low speeds before putting into regular service.

= T

A-arm Attaching Bolt Torque:
42 Nm (31 ft. lbs.)
Ball Joint Stud Nut Torque:
50 Nm (37 ft. lbs.)
Front Shock Bolt Torque:
44 Nm (32 ft. lbs.)

Swing Arm Exploded View



SWING ARM

Removal

1. Elevate rear end of ATV off the ground far enough to remove the rear wheels.

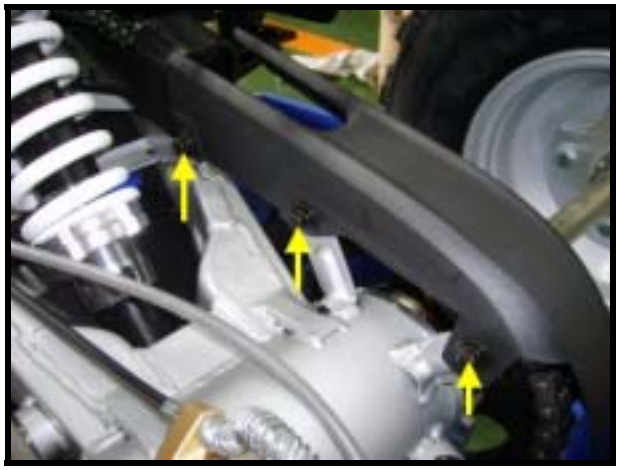
⚠ CAUTION

Severe injury could occur if machine tips or falls.

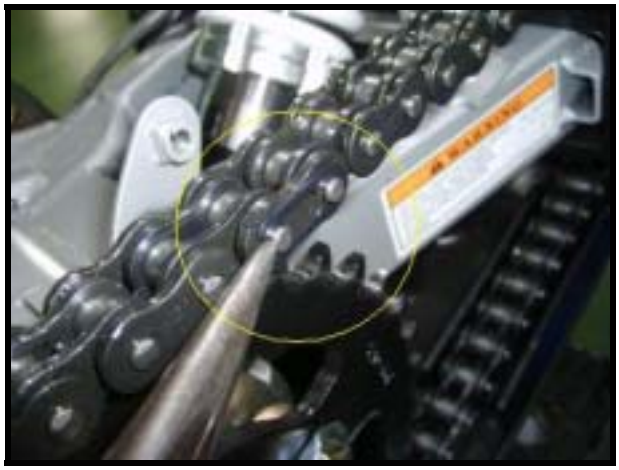
2. Remove the dust cap and cotter pin from 2 rear wheels
3. Remove 2 rear wheels nut and remove wheel and hub as an assembly.

4. Remove rear brake caliper bolts then brake caliper.

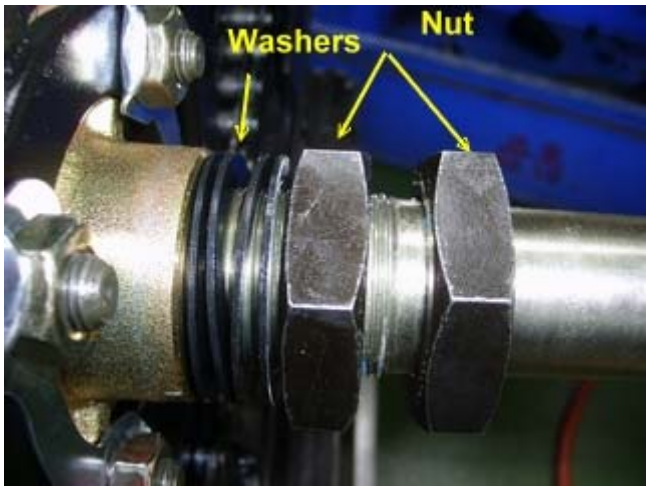
5. Remove chain protector bolts then chain protector.



6. Take off the master link from chain by pliers then remove chain from sprocket.

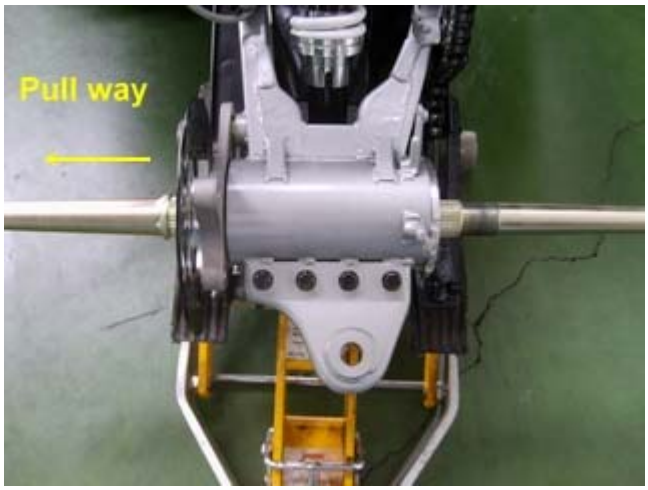


7. Loosen 2 nuts from rear axle. Ensure do not lose those washers.



8. Bend the lock bracket back the remove bolts and sprocket.

9. Pull the axle with disc toward left way, some time need to use soft hammer on right of rear axle. Ensure do not damaged axle thread.



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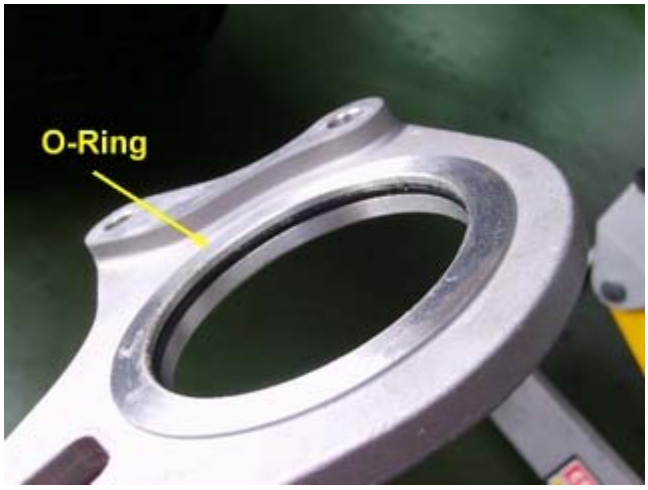
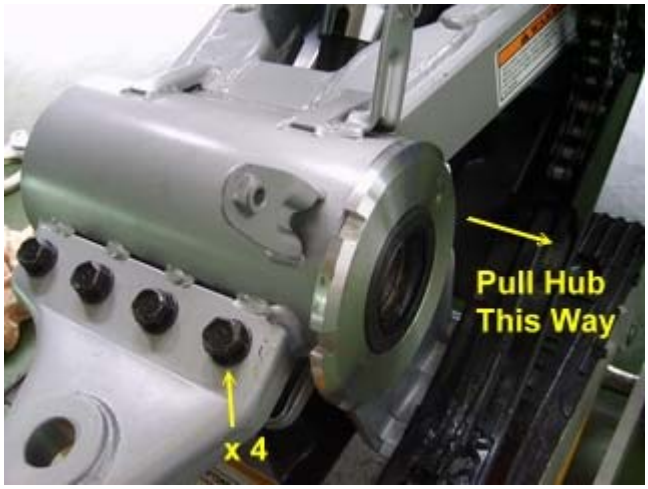
10. Remove external cir-clip and brake caliper mount.

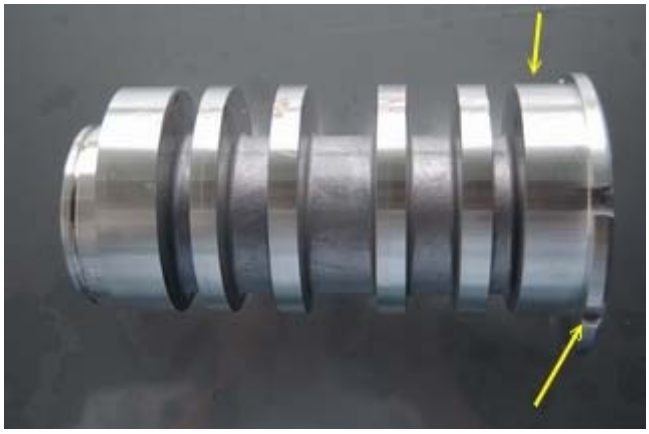
11. There is a o-ring in caliper mount.



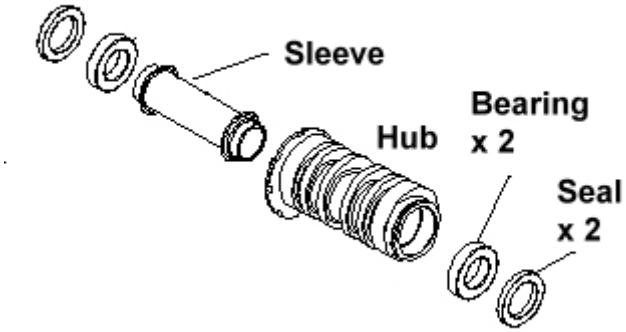
12. Loosen 4 bolts then remove axle hub toward right hand away.



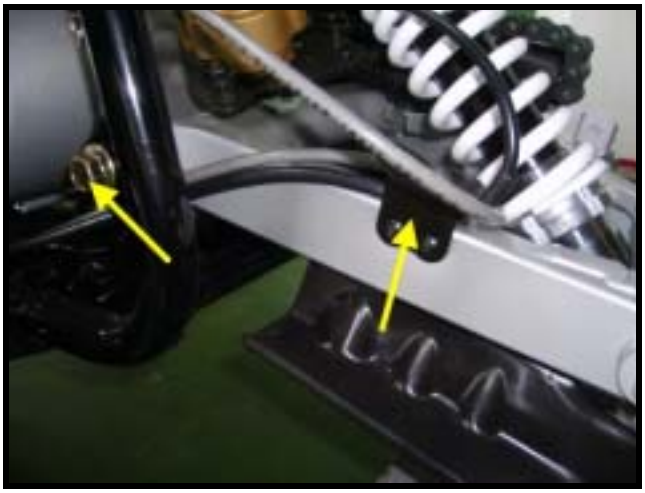
13. Inspect adjusting tooth and cam surface for wear, replace the hub if the component fail inspection.



14. Inspect the axle hub main bearings for worn or damaged. The bearing must be inspected visually and by turning feel. The bearing should turn smoothly and quietly.

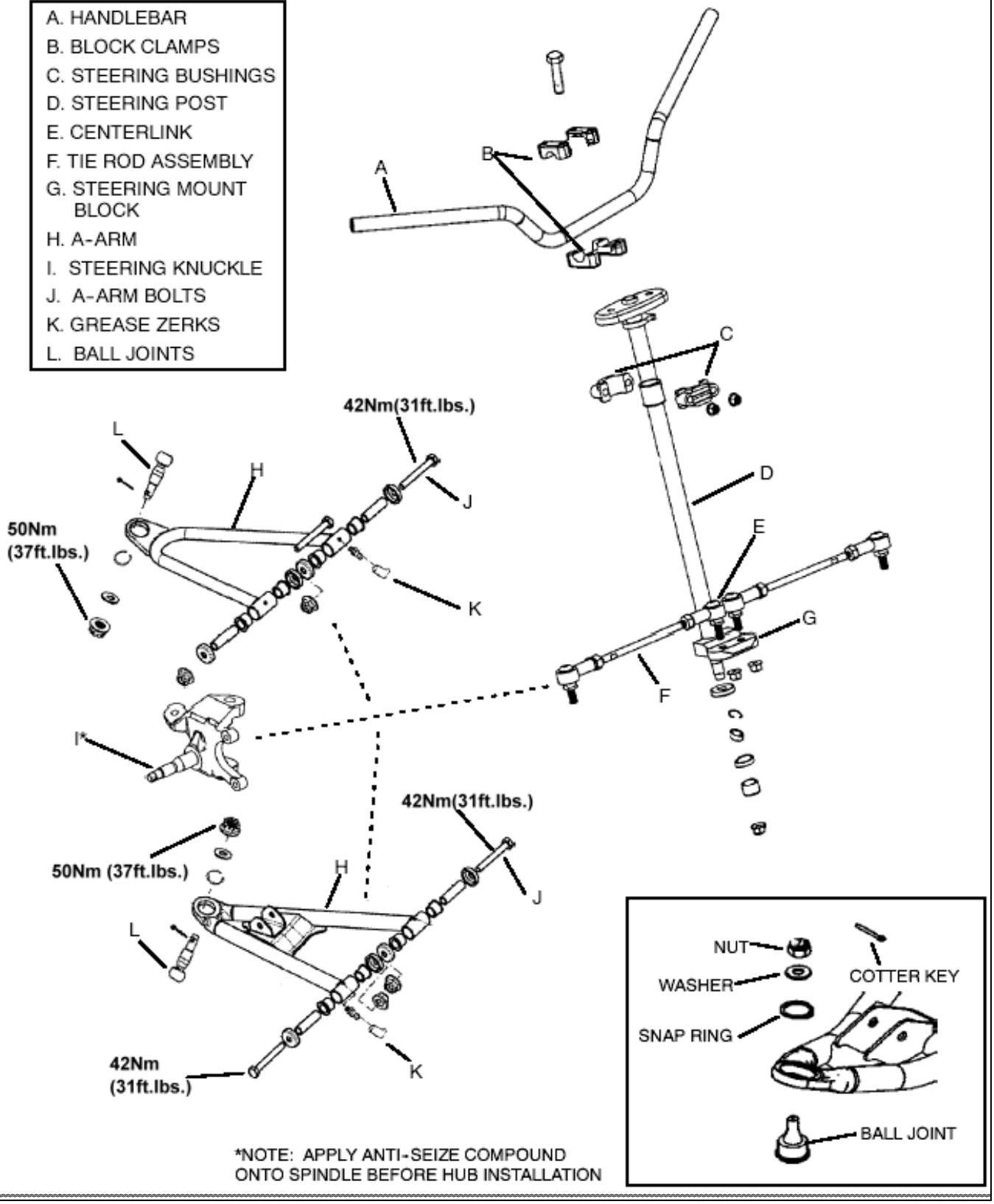


15. Remove the rear shock upper blot.
16. Remove brake tube clamp.
17. Remove swing arm shaft then swing arm.



STEERING/FRONT SUSPENSION EXPLODED VIEW

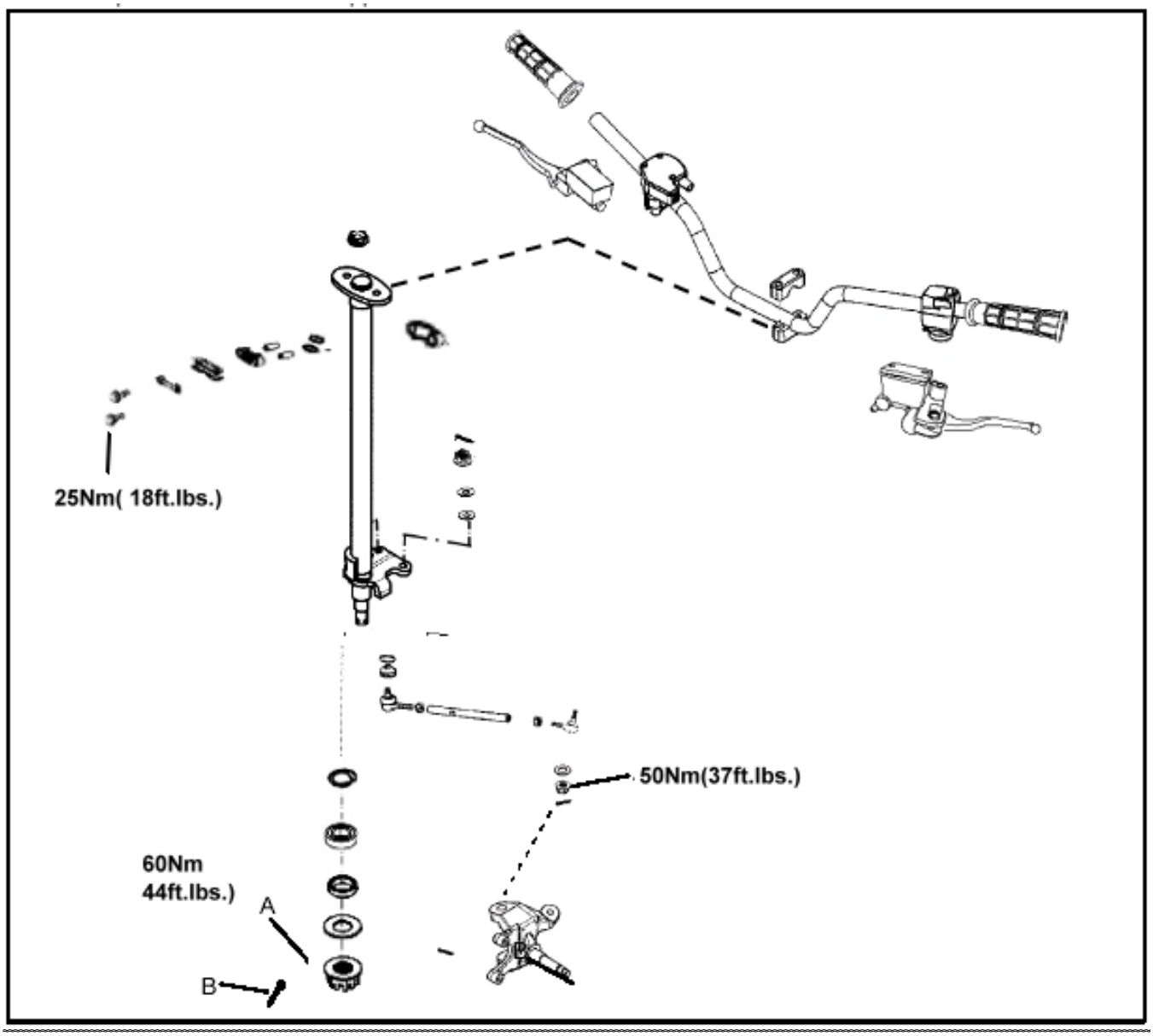
A. HANDLEBAR
B. BLOCK CLAMPS
C. STEERING BUSHINGS
D. STEERING POST
E. CENTERLINK
F. TIE ROD ASSEMBLY
G. STEERING MOUNT BLOCK
H. A-ARM
I. STEERING KNUCKLE
J. A-ARM BOLTS
K. GREASE ZERKS
L. BALL JOINTS



*NOTE: APPLY ANTI-SEIZE COMPOUND ONTO SPINDLE BEFORE HUB INSTALLATION

STEERING POST ASSEMBLY

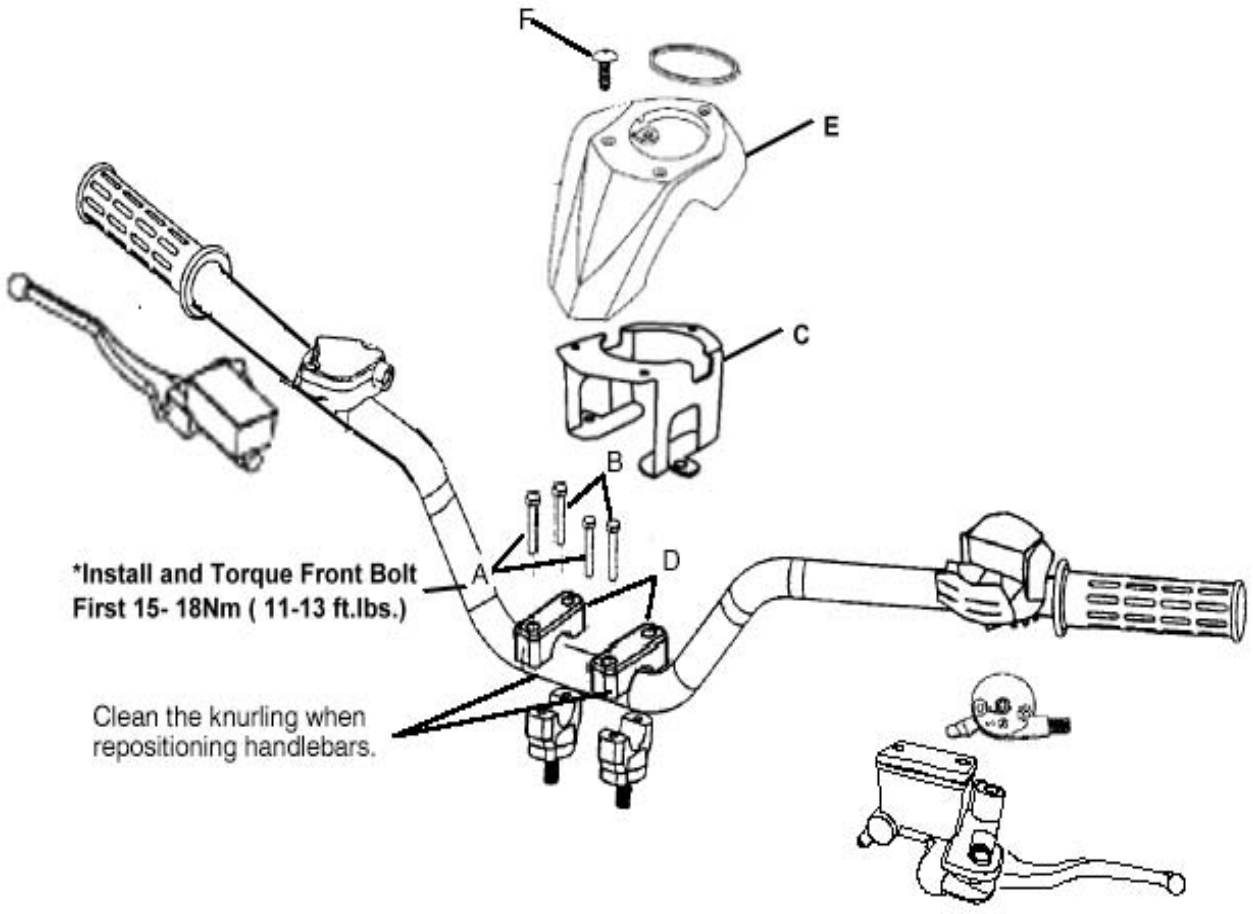
1. Torque the steering axle nut (A) to 60Nm.
2. Align the cotter pin hole.
3. Install the cotter pin (B) and bend both ends of the cotter pin around the nut in opposite directions.
4. Check the steering. The handlebars must move freely and easily from full left to full right without binding. Check all cables and electrical wires for binding and route as needed.



HANDLEBAR BLOCK INSTALLATION PROCEDURE

1. Position the two steering post blocks (D) properly onto the handlebars.
2. Install the front block bolts (A) first and evenly tighten the bolts down. Evenly torque the 2 front bolts to 15--18 Nm (11--13 ft.lbs.).
3. Install the rear bolts (B) and tighten evenly. Evenly torque the 2 rear bolts to 15--18 Nm (11--13 ft.lbs.).
4. Install the four handlebar bolts and pod bracket (C) loosely into the blocks.
5. Install the handlebar pod (E) and screws (F).

NOTE: **There will be a slight gap on the backside of the blocks after the procedure is performed**.



DECAL REPLACEMENT

⚠ WARNING

The following procedure involves the use of an open flame. Perform this procedure in a well ventilated area, away from gasoline or other flammable materials. Be sure the area to be flame treated is clean and free of gasoline or flammable residue.

⚠ WARNING

Do not flame treat components that are installed on the vehicle. Remove the component from the vehicle before flame treating.

The side panels, front and rear fender cabs are plastic polyethylene material. Therefore, they must be “flame treated” prior to installing a decal to ensure good adhesion. A bonus of the flame treating procedure is it can be used to reduce or eliminate the whitish stress marks that are sometimes left after a fender or cab is bent, flexed, or damaged.

To flame treat the decal area:

1. Pass the flame of a propane torch back and forth quickly over the area where the decal is to be applied until the surface appears slightly glossy. This should occur after just a few seconds of flame treating. Do not hold the torch too close to the surface (5- 7.5 cm. from the flame tip is recommended). Keep the torch moving to prevent damage.
2. Apply the decal on one edge first. Slowly lay down remainder of the decal while rubbing lightly over the decal surface to eliminate any air bubbles during the application.

CHAPTER 8

BRAKES

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General Specifications

Front Brake Disc		
Item	**Standard**	**Service Limit**
Brake Pad Thickness	**7.6 mm (0.298")**	**4.3 mm (0.17")**
Brake Disc Thickness	**4mm (0.16")**	**3.5mm (0.14")**
Brake Disc Thickness Variance Between Measurements	--	**0.05mm (0.002")**
Brake Disc Runout	--	**0.25mm (0.01")**
Rear Brake Disc		
Item	**Standard**	**Service Limit**
Brake Pad Thickness	**7.8 mm (0.20")**	**4.5 mm (0.18")**
Brake Disc Thickness	**4.2 mm (0.17")**	**3.8mm (0.15")**
Brake Disc Thickness Variance Between Measurements	--	**0.05mm (0.002")**
Brake Disc Runout	--	**0.25mm (0.01")**

Torque Specifications

Item	**Torque (Nm)**	**Torque (ft. lbs. except where noted*)**
Front Caliper Mounting Bolts	**25**	**18**
Rear Caliper Mounting Bolts	**42**	**31**
Master Cylinder Reservoir Cover Bolts	**0.6**	**5 in.lbs.**
Brake Line Banjo Bolt	**20**	**15**
Brake Disc Mounting Bolts	**29**	**21.4**
Caliper Bleed Screws	**3**	**27 in.lbs.**
Foot Brake Master Cylinder Mounting Bolt	**25**	**18**
Shunt Mounting Bolt	**20**	**15**

NOTE: Refer to the tightening procedures in this chapter when torquing the bolts. Some special procedures are used when torquing certain bolts and fasteners.

BRAKE SYSTEM SERVICE NOTES

Disc brake systems are light weight, low maintenance, and perform well in the conditions ATVs routinely encounter. There are a few things to remember when replacing disc brake pads or performing brake system service to ensure proper system function and maximum pad service life.

◎ Optional pads are available to suit conditions in your area. Select a pad to fit riding style and environment.
◎ Do not over-fill the master cylinder fluid reservoirs.
◎ Make sure the brake levers return freely and completely.
◎ Check and adjust master cylinder reservoir fluid levels after pad service.
◎ Make sure atmospheric vent on reservoirs are unobstructed.
◎ Test for brake drag after any brake system service and investigate cause if brake drag is evident.
◎ Make sure caliper moves freely on guide pins.
◎ Inspect caliper piston seals for foreign material that could prevent caliper pistons from returning freely.
◎ Perform a brake burnishing procedure after installing new pads to maximize service life.

⚠ CAUTION

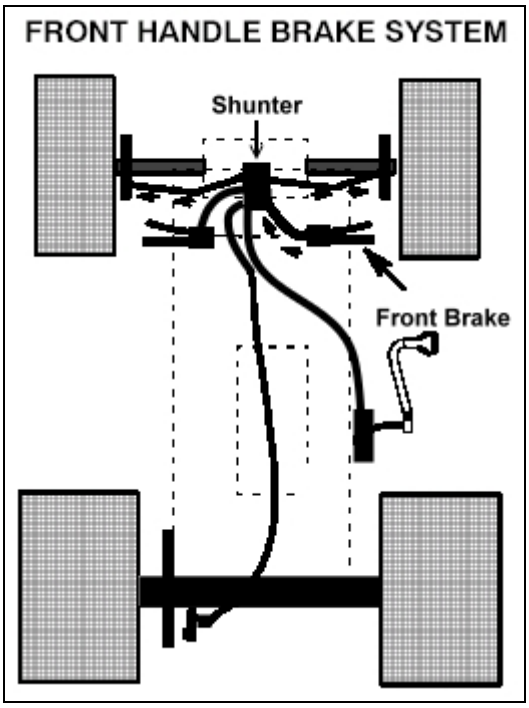
Use only DOT 4 brake fluid as an assembly aid for all procedures described in this chapter to prevent brake system contamination.
DO NOT USE LUBRICANTS OF ANY KIND FOR ASSEMBLY.

DISC BRAKE NOISE TROUBLESHOOTING

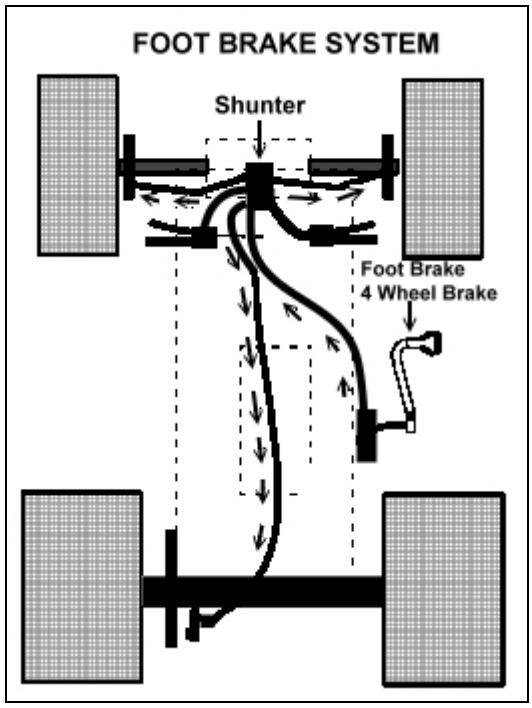
Dirt or dust buildup on the brake pads and disc is the most common cause of brake noise (squeal caused by vibration). If cleaning does not reduce the occurrence of brake noise, check the backing of each pad for worn spots allowing metal to metal contact. See table below.

Brake Noise Troubleshooting	
Possible Cause	**Remedy**
Dirt, dust, or imbedded material on pads or disc	Spray disc and pads with a non-flammable aerosol brake cleaner only! Remove pads and/or disc hub to clean imbedded material from disc or pads.
Pad(s) dragging on disc (noise or premature pad wear)	
Improper adjustment	Adjust pad stop.
Insufficient lever or pedal clearance	Check position of controls & switches.
Master cylinder reservoir overfilled	Set to proper level
Master cylinder compensating port restricted	Clean compensating port
Master cylinder piston not returning completely	Inspect. Repair as necessary
Caliper piston(s) not returning	Clean piston(s) seal
Operator error (riding the brake / park brake applied)	Educate operator
Loose wheel hub or bearings	Check wheel and hub for abnormal movement.
Brake disc warped or excessively worn	Replace disc
Brake disc misaligned or loose	Inspect and repair as necessary
Noise is from other source (chain, axle, hub, disc or wheel)	If noise does not change when brake is applied check other sources. Inspect and repair as necessary
Wrong pad for conditions	Change to a softer or harder pad

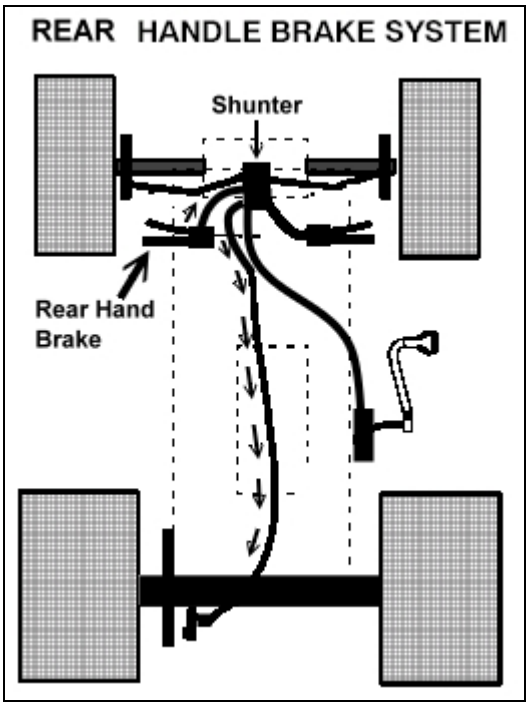
BRAKE SYSTEM OPERATION



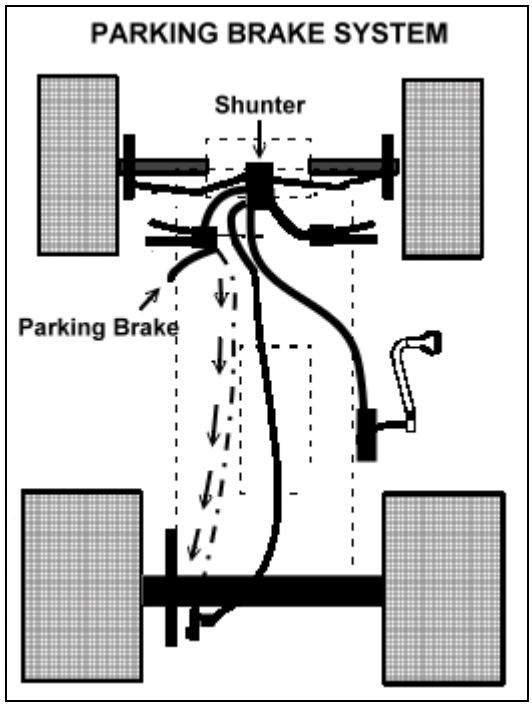
The front brake system is hydraulically actuated. When the right front brake lever (master cylinder) is applied, the two front brake calipers are active and under pressure.



The foot brake system is hydraulically actuated. When the right foot brake lever (master cylinder) is applied, the two front brake calipers and a rear caliper are active and under pressure.

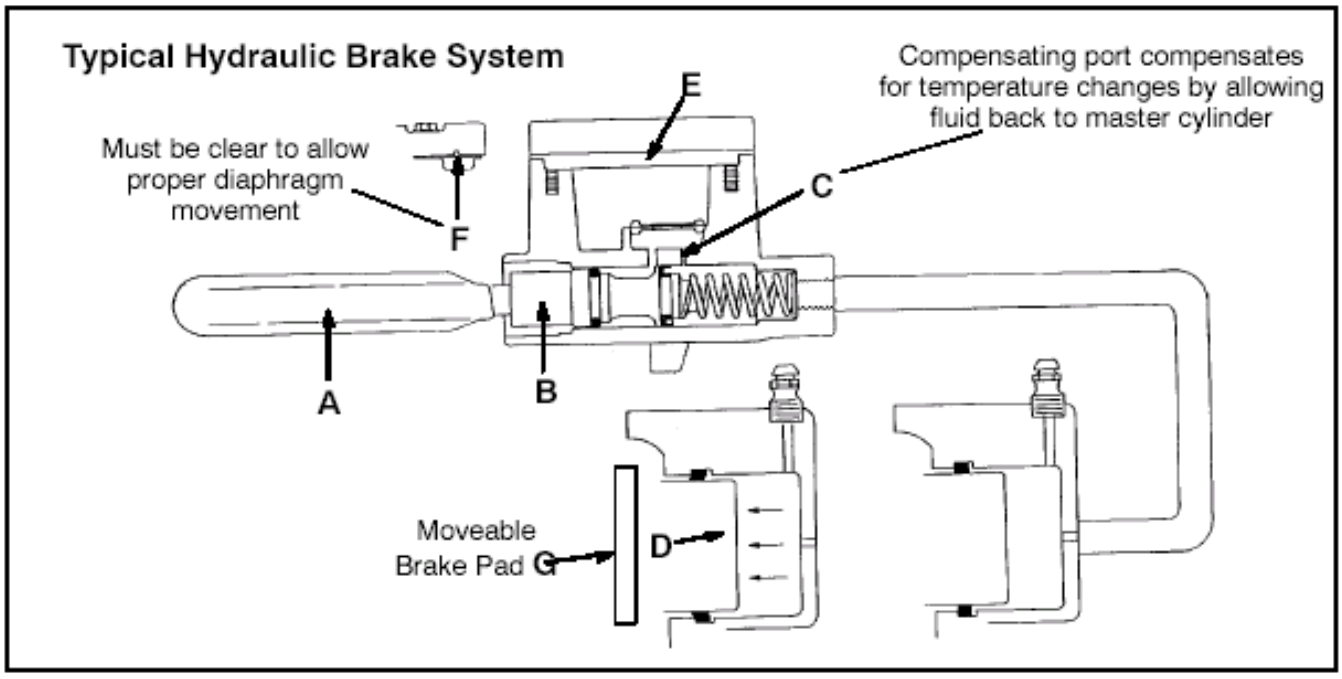


The rear brake system is hydraulically actuated. When the right front brake lever (master cylinder) is applied, the rear brake caliper is active and under pressure.



The parking brake system operates using mechanical brake cables. The left front parking brake lever operates the rear brake caliper assembly.

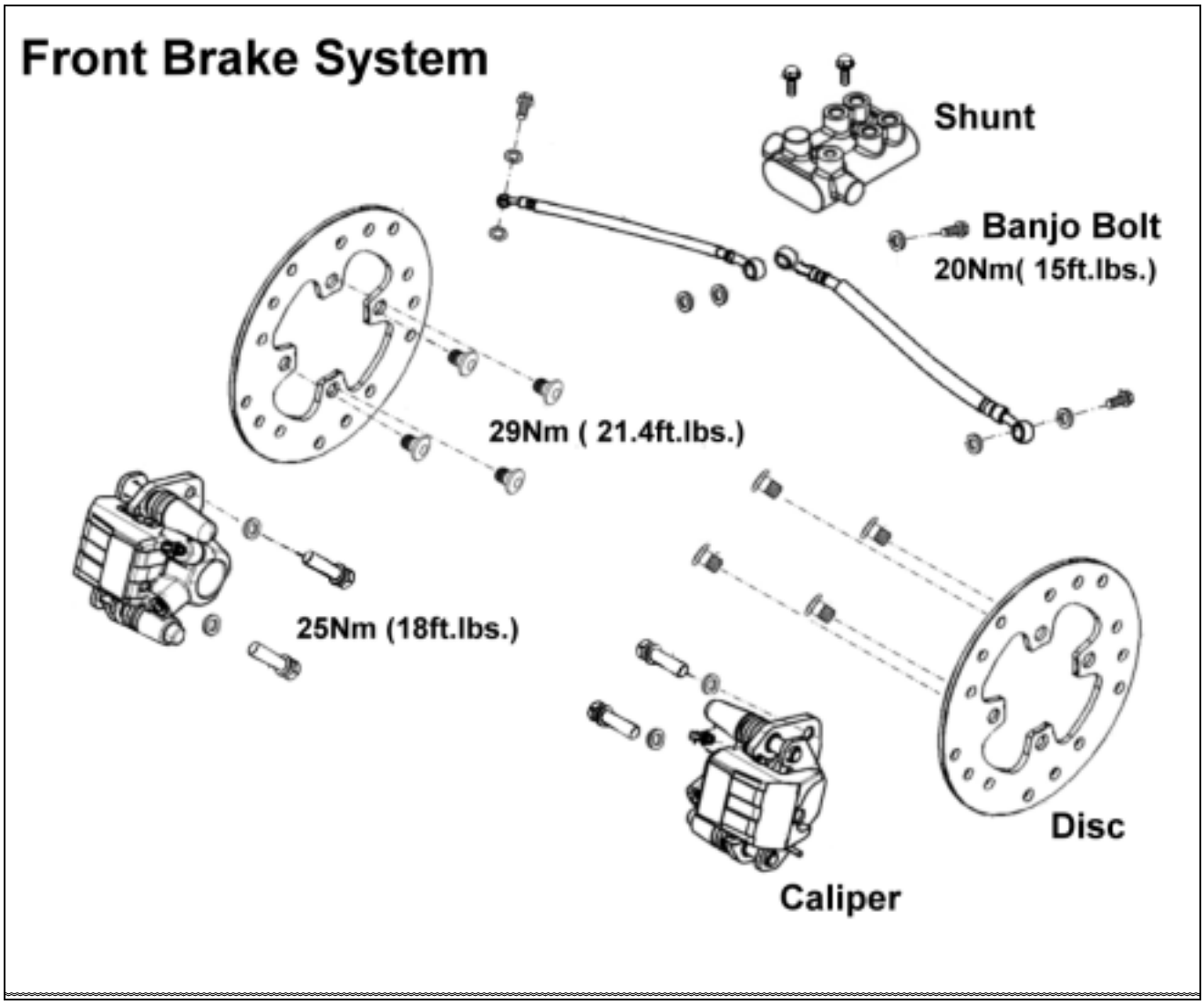
FRONT BRAKE

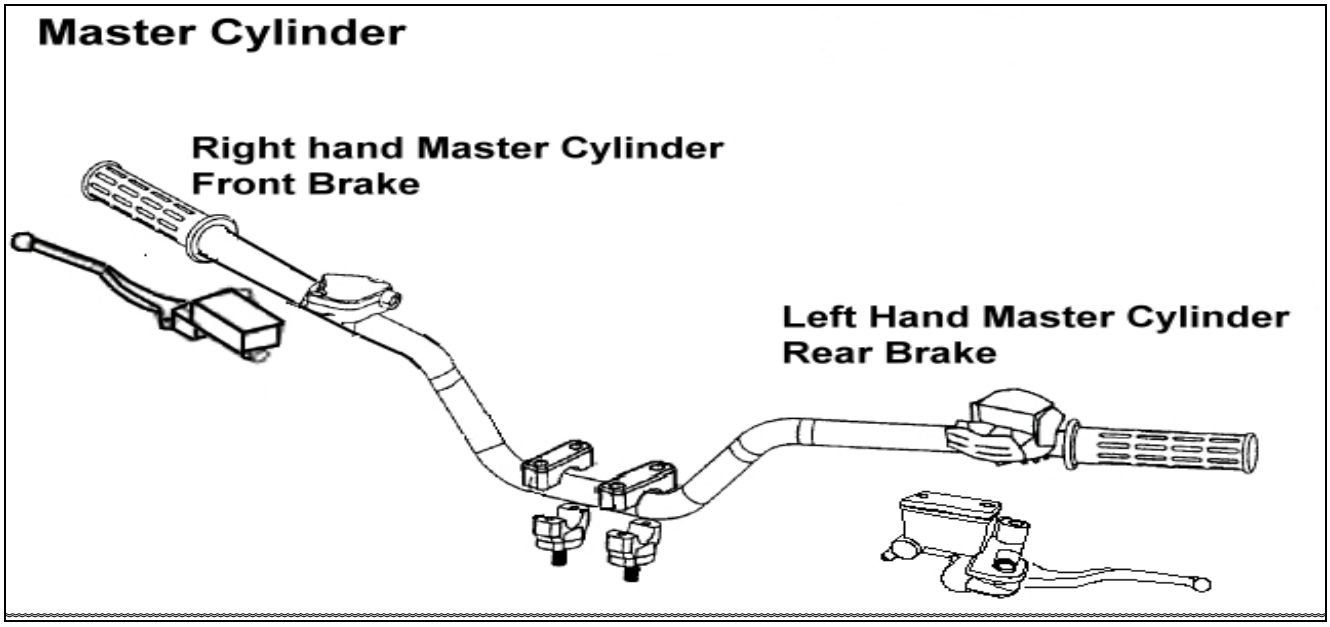


The front brake system consists of the following components or assemblies: brake lever; master cylinder; hydraulic hose; brake calipers (slave cylinder); brake pads; and brake discs, which are secured to the drive line.
When the hand activated brake lever (A) is applied it contacts a piston (B) within the master cylinder. As the master cylinder piston moves inward it closes a small opening (compensating port) (C) within the cylinder and starts to build pressure within the brake system. As the pressure within the system is increased, the piston (D) located in the brake caliper moves outward and applies pressure to the moveable brake pad. This pad contacts the brake disc and moves the caliper in its floating bracket, pulling the stationary side pad into the brake disc. The resulting friction reduces brake disc and vehicle speed. As the lever pressure is increased, the braking affect is also increased.
The friction applied to the brake pads will cause the pads to wear. As these pads wear, the piston within the caliper moves further outward and becomes self-adjusting. Fluid from the reservoir fills the additional area created when the caliper piston moves outward.
Brake fluid level is critical to proper system operation. Too little fluid will allow air to enter the system and cause the brakes to feel spongy. Too much fluid could cause brakes to drag due to fluid expansion.
Located within the master cylinder is the compensating port (C), which is opened and closed by the master cylinder piston assembly. The port is open when the lever is released and the master cylinder piston is outward. As the temperature within the hydraulic system changes, this port compensates for fluid expansion (heated fluid) or contraction (cooled fluid). During system service, be sure this port is open. Due to the high temperatures created within the system during heavy braking, it is very important that the master cylinder reservoir have adequate space to allow for fluid expansion. **Never overfill the reservoir!** Fill to 0.64 - 0.80 cm (1/4 〃 - 5/16 〃) from top of the cylinder.
This system also incorporates a diaphragm (E) as part of the cover gasket; and a vent port (F) located between the gasket and the cover. The combination diaphragm and vent allow for the air above the fluid to equalize pressure as the fluid expands or contracts. Make sure the vent is open and allowed to function. If the reservoir is over filled or the diaphragm vent is plugged the expanding fluid may build pressure in the brake system leading to brake failure.
When servicing brake systems use only DOT 4 High Temperature Brake Fluid.

⚠ WARNING
Once a bottle is opened, use what is necessary and discard the rest in accordance with local laws. Do not store or use a partial bottle of brake fluid. DOT 4 Brake fluids is hygroscopic, meaning it rapidly absorbs moisture. This causes the boiling temperature of the brake fluid to drop, which can lead to brake fade and possible loss of control.

FRONT BRAKE EXPLODED VIEW





FRONT BRAKE REPLACEMENT/ BLEEDING PROCEDURE

NOTE: When bleeding the brakes or replacing the fluid always start with the caliper farthest from the master cylinder.

⚠ CAUTION
Always wear safety glasses during these procedures.

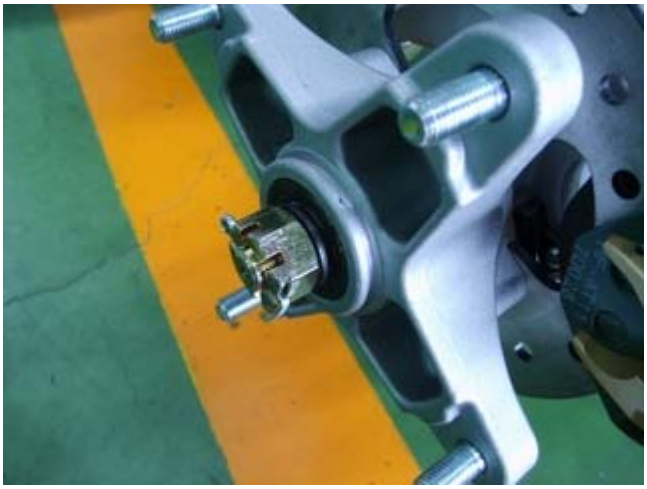
⚠ CAUTION
Brake fluid will damage finished surfaces. Do not allow brake fluid to come in contact with finished surfaces.

⚠ CAUTION
Severe injury could occur if machine tips or falls.

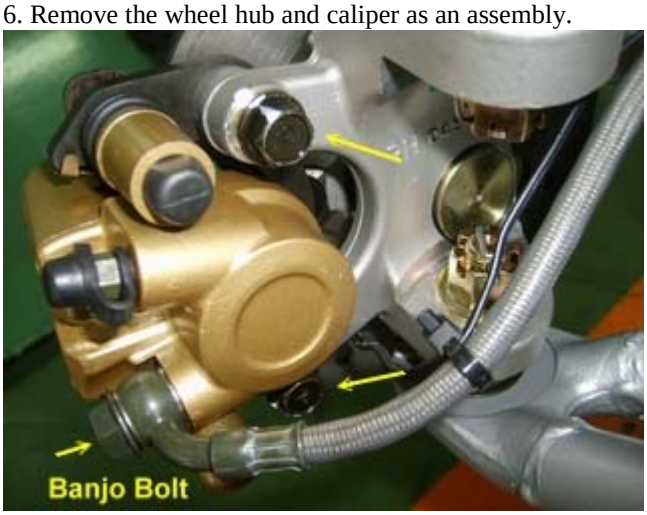
1. Elevate front end of ATV off the ground far enough to remove the wheel.
2. Remove the dust cap and cotter pin.
3. Remove wheel nuts and remove wheel and rim as an assembly.

.

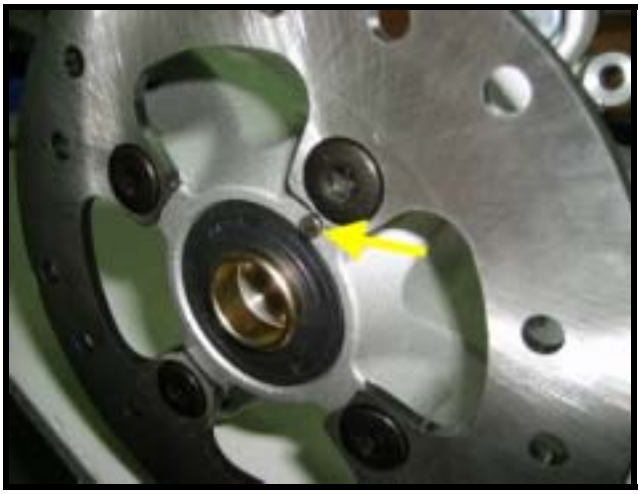
4. Remove the cotter pin, nut and washer.



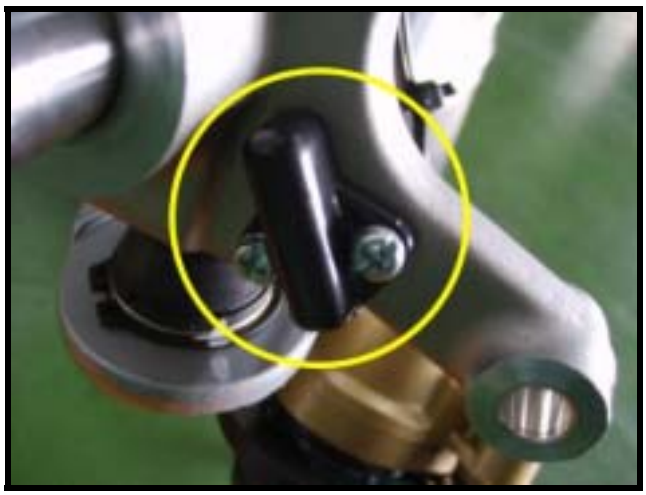
5. Remove the caliper two fastens bolts on knuckle and the banjo bolt on caliper and oil tube.
6. Remove the wheel hub and caliper as an assembly.



6. Ensure do not lose speedometer magnet.
7. Inspect the brake pads contact disc surface for excessive wear, pitting, or damage. Replace if necessary.

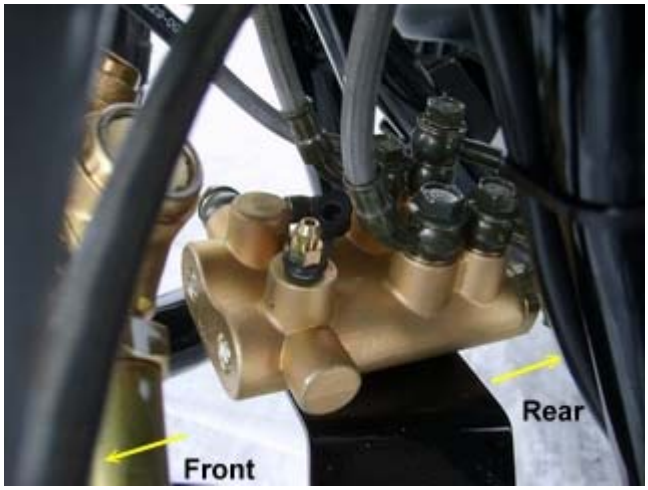


8. Remove the disc blots then disc.
9. Remove the speedometer sensor.

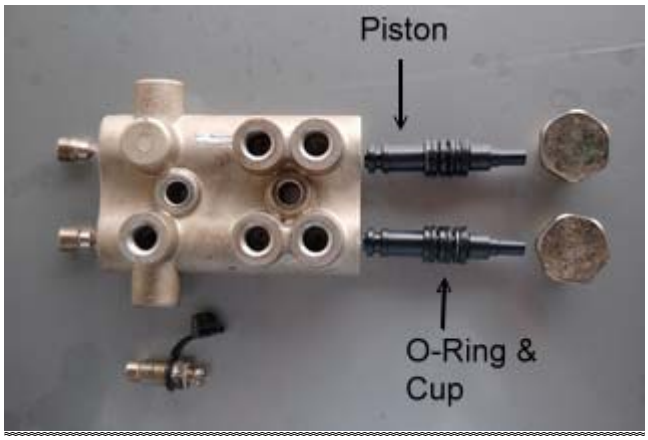


10. The front left hand brake use same procedure.

Shunt Removal



1. Remove two mounting bolts under frame.
2. Remove all banjo bolts then shunt.
3. Inspect two piston's o-ring and rubber cups surface for wear or other damage. Replace an assembly if necessary.

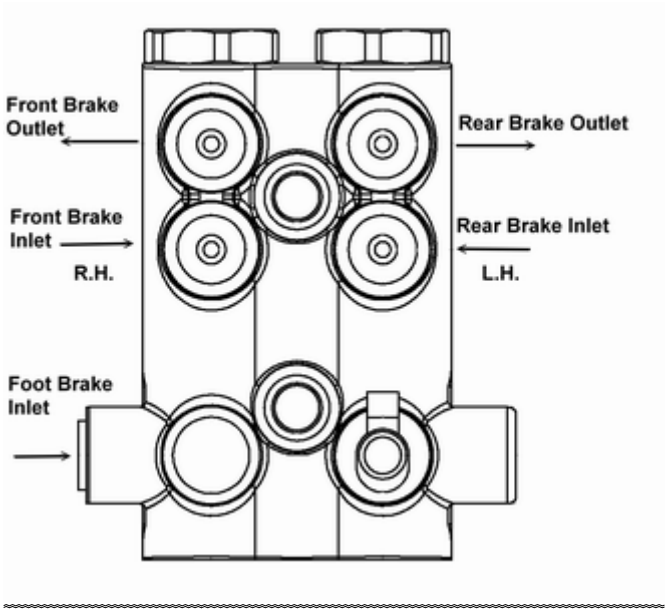


4. The shunt system is hydraulically actuated.

◎When the right foot brake lever (master cylinder) is applied, the two front brake calipers and a rear caliper are active and under pressure.

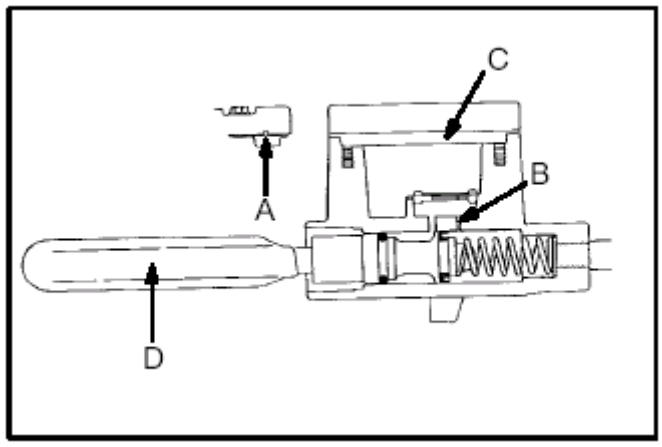
◎When the right front brake lever (master cylinder) is applied, the two front brake calipers are active and under pressure.

◎When the right front brake lever (master cylinder) is applied, the rear brake caliper is active and under pressure.

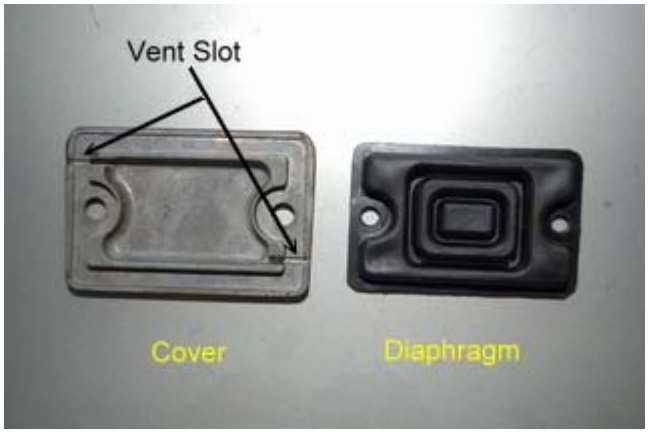


FRONT BRAKE – BLEEDING/ FLUID CHANGE

NOTE: This procedure should be used to change fluid or bleed brakes during regular maintenance.



1. Clean reservoirs cover thoroughly.
2. Remove screws, cover, and diaphragm from reservoir.



3. Inspect vent slots in cover and remove any debris or blockage.
4. If changing fluid, remove old fluid from reservoir with a Mity Vacuum or similar tool.

NOTE: Do not remove brake lever when reservoir fluid level is low.

5. Add brake fluid to the upper level mark on reservoir.

Recommend Brake Fluid
DOT 4 Brake Fluid

6. Begin bleeding procedure with the caliper that is farthest from the master cylinder. Install a wrench on the top caliper bleeder screw.
Attach a clean, clear hose to fitting and place the other end in a clean container. Be sure the hose fits tightly on fitting.

NOTE: When brake lever is pumped. Place diaphragm in reservoir to prevent spills. Do not install cover.

7. Slowly pump brake lever until pressure builds and holds.
8. While maintaining lever pressure, open bleeder screw. Close bleeder screw and release brake lever.

NOTE: Do not release lever before bleeder screw is tight or air may be drawn into caliper.

9. Repeat procedure until clean fluid appears in bleeder hose and all air has been purged. Add fluid as necessary to maintain level in reservoir.

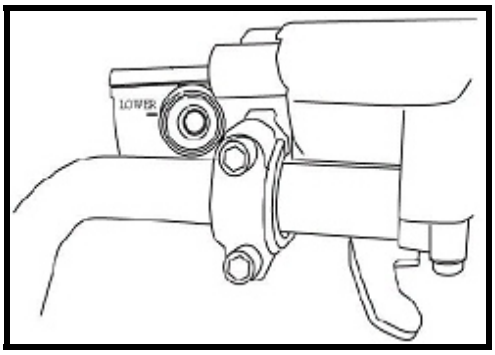
NOTE: If brake pressure is hard to built, repeat breeding procedure with shunt breeding screw.

⚠ CAUTION
Maintain at least 2 cm of brake fluid in the reservoir to prevent air from entering the master cylinder.

10. Tighten bleeder screw securely and remove bleeder hose. Torque bleeder screw to 3 Nm (27 in.lbs.).
11. Repeat procedure Steps 5-9 for the remaining caliper(s).

12. Add brake fluid to the proper level.

Master Cylinder Fluid Level: MAX level inside reservoir Sight glass must look dark, if sight glass is clear, fluid level is too low



13. Install diaphragm, cover, and screws.

14. Field test machine at low speed before putting into service. Check for proper braking action and lever reserve. With lever firmly applied, lever reserve should be no less than 2 cm from handlebar.

15. Check brake system for fluid leaks and inspect all hoses and lines for wear or abrasion. Replace hose if wear or abrasion is found.

NOTE:

1. **Check the fluid lever often while bleeding the brake to prevent air from being pumped into the system.**
2. **Repeat the above procedure until air bubbles do not appear in the plastic hose.**
3. **If air is entering the bleeder from around the bleed valve threads, seal the threads with Teflon tape.**
4. **Close the bleed valve and operate brake lever. If it still feels spongy, bleed the system again.**
5. **If a brake bleeder is not available, use the following procedure:**

Pump up the system pressure with the brake lever until lever resistance is felt.

MASTER CYLINDER REMOVAL

1. Clean master cylinder and reservoir assembly. Make sure you have a clean work area to disassemble brake components.

2. Place a shop towel under brake line connection at master cylinder. Loosen banjo bolt; remove bolt and sealing washers.

⚠ CAUTION
Brake fluid will damage finished surfaces. Do not allow brake fluid to come in contact with finished surfaces.

3. Loosen the master cylinder clamp bolts on the handlebar side of the master cylinder.

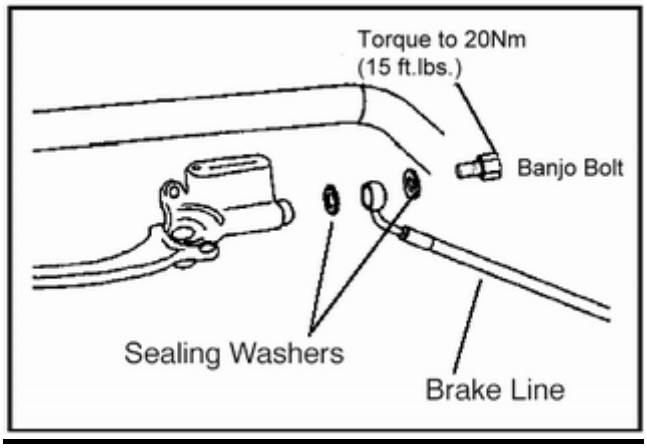
4. Remove master cylinder from handlebars.

MASTER CYLINDER INSTALLATION

1. Install master cylinder on handlebars. Torque mounting bolts to **3 Nm (25 in. lbs.)**. Torque the top bolt first.

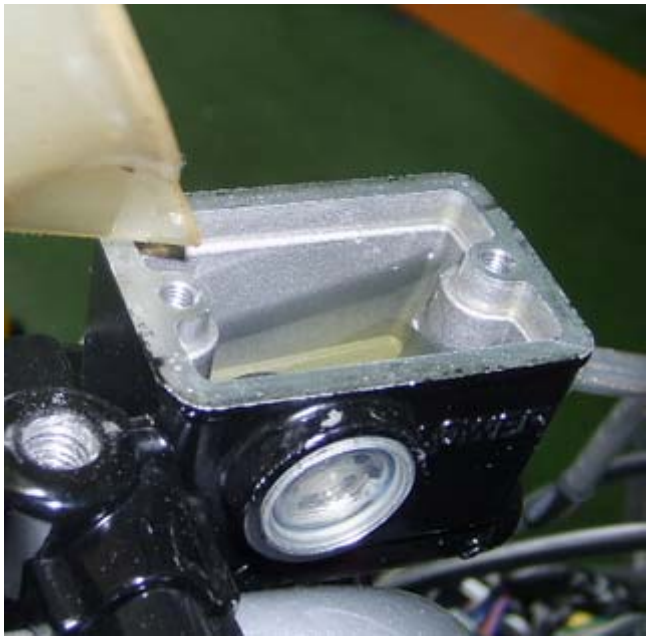
NOTE: To speed up the brake bleeding procedure the master cylinder can be purged of air before brake line is attached. Fill with DOT4 Brake Fluid and pump lever slowly two to three times with finger over the outlet end to purge master cylinder of air.

2. Place new sealing washers on each side of banjo brake line. Install the brake line into the master cylinder. Torque the banjo bolt to **20 Nm (15 ft.lbs.)**.



Master Cylinder Mounting Clamp Bolt Torque: 3 Nm (25 in. lbs.) Banjo Bolt Torque: 20 Nm (15 ft. lbs.)

3. Fill reservoir with DOT4 Brake Fluid.



4. Follow bleeding procedure on Pages 8.8.

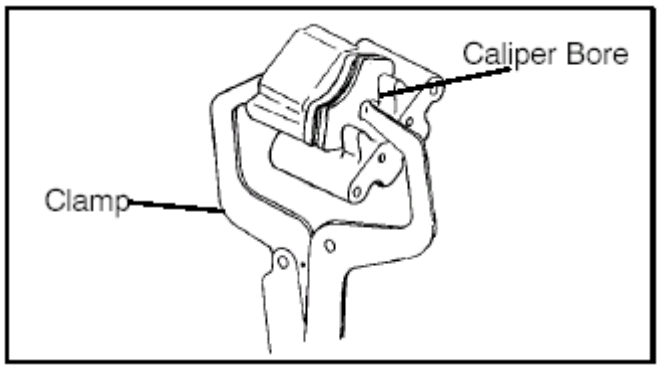
Check all connections for leaks and repair if necessary.

FRONT PADS REMOVAL

1. Follow front caliper remove procedure on page 8.6.

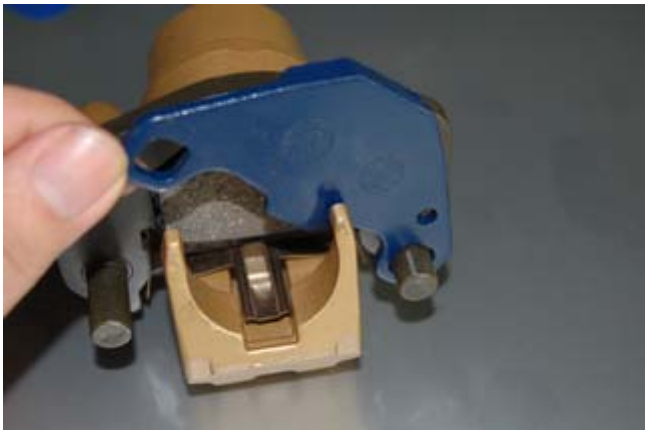
⚠ CAUTION
Severe injury could occur if machine tips or falls.

2. With pads remove, push caliper piston into caliper bore slowly using a C-clamp or locking pliers.



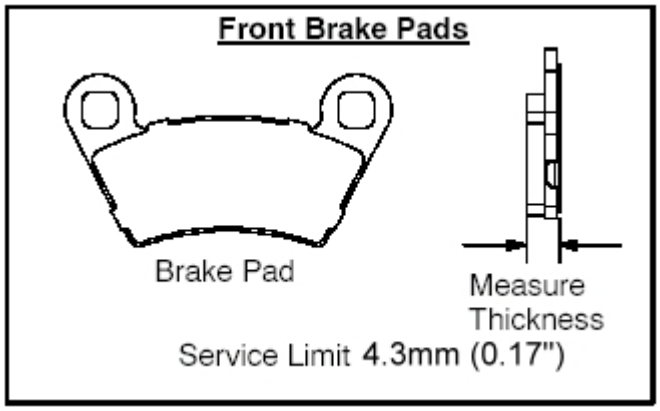
NOTE: Brake fluid will be forced through compensating port into master cylinder fluid reservoir when piston is pushed back into caliper. Remove excess fluid from reservoir as required.

3. Remove the brake pads out of the caliper assembly.



4. Measure the thickness of the pad material.
Replace pads if worn beyond the service limit.

= mm./ In.
Front Brake Pad Thickness
New 7.6mm(0.298 〃)
Service Limit 4.30mm (0.170 〃)



FRONT PAD ASSEMBLY

⚠ WARNING

If the brake pads are contaminated with grease, oil, or liquid soaked do not use the pads, use only new clean pads.

1. Install pads with friction material facing each other. Install the brake pads. Be sure pads and disc is free of dirt or grease.

2. Install caliper on the steering knuckle, and torque mounting bolts. (If previously removed.)

Front Caliper Mounting Bolts
Torque: 25 Nm (18 ft. lbs.)

3. Slowly pump the brake lever until pressure has been built up. Maintain at least 20 mm of brake fluid in the reservoir to prevent air from entering the brake system.
4. Be sure fluid level in reservoir is between MIN and MAX lines and install reservoir cap.
5. Install wheels and torque wheel nuts.

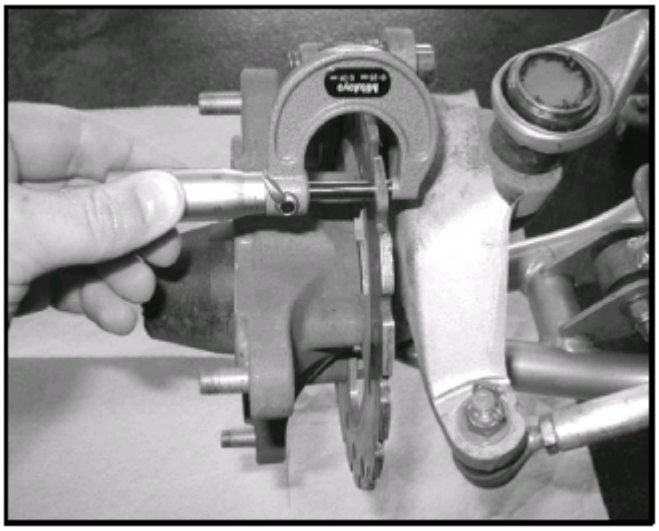
Front Wheel Nut Torque
40 Nm (30 ft. lbs.)

6. **BRAKE BURNISHING: It is recommended that a burnishing procedure be performed after installation of new brake pads to extend service life and reduce noise. Start machine and slowly increase speed to 50 km. Gradually apply brakes to stop machine. Repeat this procedure 10 times, allowing brakes to cool sufficiently after each run.**

FRONT DISC INSPECTION

1. Visually inspect the brake disc for nicks, scratches, or damage.

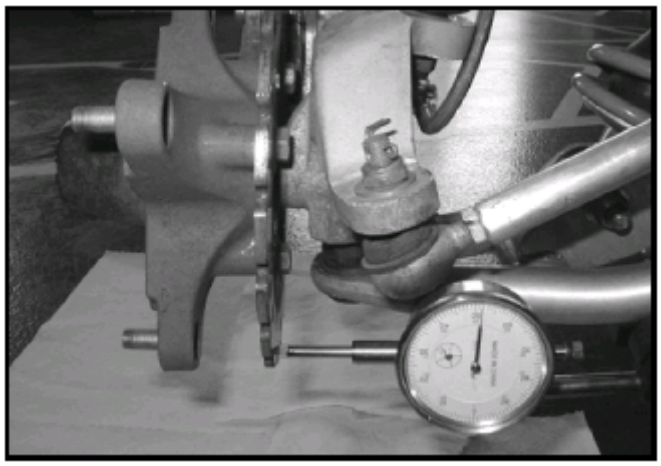
2. Measure the disc thickness at 8 different points around the pad contact surface using a 0-1〃 micrometer. Replace disc if worn beyond service limit.



Brake Disc Thickness
Service Limit 3.8mm (0.15")
New . 4.2mm (0.17")

Brake Disc Thickness Variance
Service Limit 0.05 mm (0.002")
difference between measurements.

3. Mount dial indicator as shown to measure disc runout. Slowly rotate the disc and read total runout on the dial indicator. Replace the disc if runout exceeds specifications.



Brake Disc Runout
Service Limit . 0.25 mm (0.01")

FRONT BRAKE DISC REMOVAL / REPLACEMENT

1. Apply heat to the hub in the area of the brake disc mounting bolts to soften the bolt locking agent.

2. Remove bolts and disc.

3. Clean mating surface of disc and hub.

4. Install disc on hub.

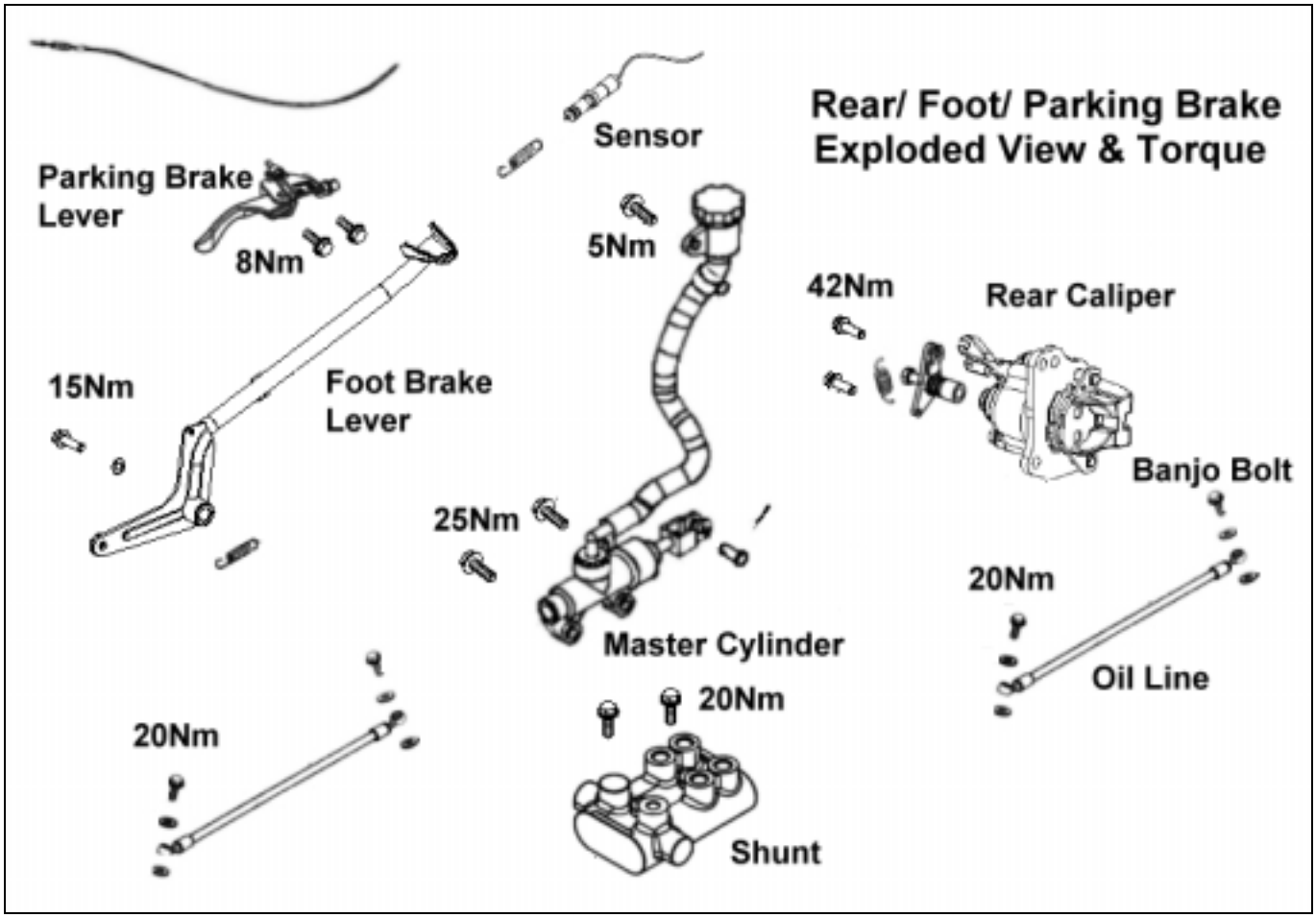
⚠ CAUTION

Always use new brake disc mounting bolts. The bolts have a pre-applied locking agent which is destroyed upon removal.

5. Install new bolts and tighten to specified torque.

Front Brake Disc Mounting Bolt Torque
29 Nm (21.4 ft. lbs.)

REAR BRAKE



Rear Brake Removal and Inspection

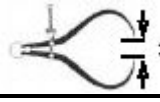
NOTE: Follow the "Swing Arm Removal" procedure outlined in Chapter 6 to access the rear brake components.

1. Follow the "Swing Arm Removal" procedure to the point where the rear brake disc housing can be accessed on **"Chapter 7"**.

NOTE: You do not need to fully disassemble the rear axle / swing arm to service the rear brakes.

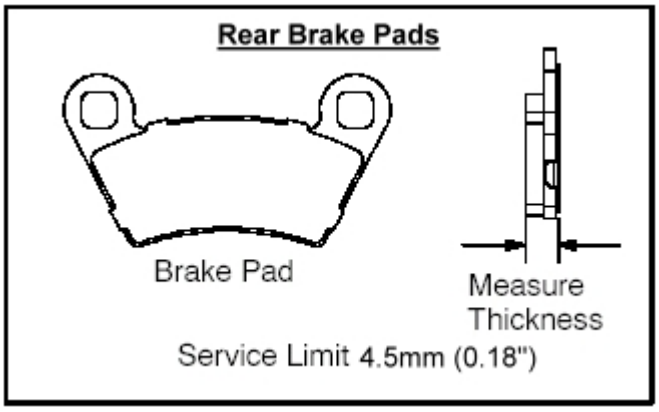
2. Inspect the brake pads contact disc surface and the axle housing seal surface for excessive wear, pitting, or damage. Replace if necessary.

3. Remove the brake pads from the rear caliper assembly. Follow "Front pads remove" procedure on page 8.11.



Rear Brake Pad Thickness:

Service Limit: (2 mm)



Rear Caliper Fluid Replacement and Air Bleeding

Brake fluid draining

1. Remover the master cylinder cover.

2. Connect the bleed house to bleed screw.
3. Loosen the bleed screw of rear caliper and shunt.

4. Pump the brake lever until no more fluid flow out of the bleed screw.

Rear caliper fluid filling/ bleeding

Follow the "Front Brake-Bleeding Procedure" on page 8.8 to 8.10.

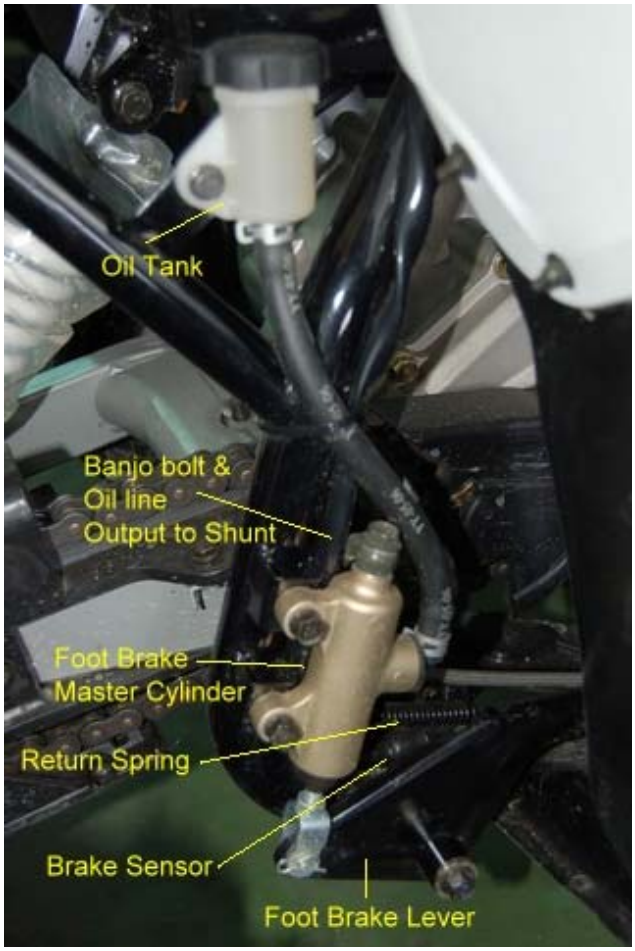
NOTE:

1. Check the fluid lever often while bleeding the brake to prevent air from being pumped into the system.
2. Repeat the above procedure until air bubbles do not appear in the plastic hose.
3. If air is entering the bleeder from around the bleed screw threads, seal the threads with Teflon tape.
4. Close the bleed screw and operate brake lever. If it still feels spongy, bleed the system again.
5. If a brake bleeder is not available, use the following procedure:

Pump up the system pressure with the brake lever until lever resistance is felt.

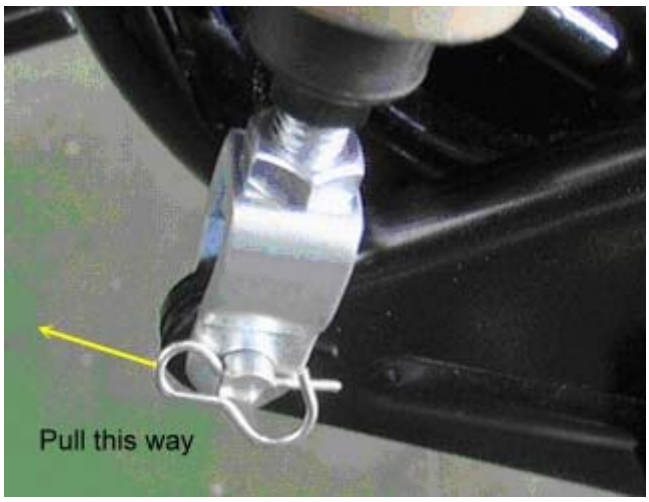
Foot Brake Removal

Note: The foot brake system is hydraulically actuated. Where is under right hand rear cab. When the right foot brake lever (master cylinder) is applied, the brake oil output to shunt. The two front brake calipers and a rear caliper are active and under pressure.

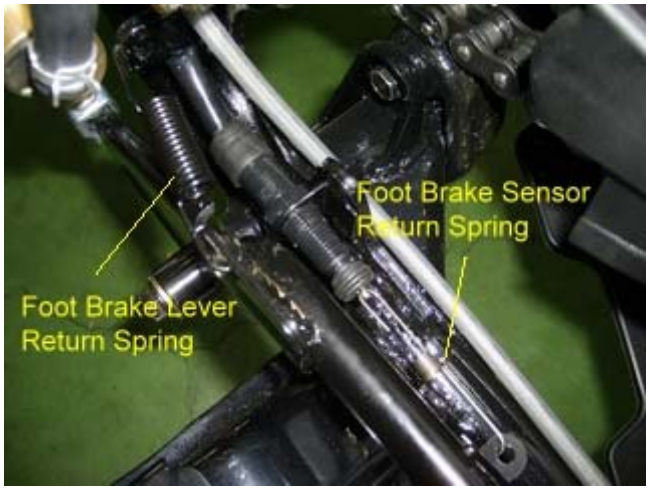


1. Remove right hand foot well from body.

2. Remove the cotter pin from foot brake lever and foot brake master cylinder.



3. Loosen foot brake lever and brake sensor return spring with long nose pliers.



4. Remove the brake lever fastener bolt.

5. Remove 2 master cylinder bolts, banjo bolt and oil tank bolt.

Remove master cylinder and oil tank as an assembly.

5. Remove foot brake lever and other components, arrange them order.

Foot brake fluid filling/ bleeding

1. Remove cover, and diaphragm from reservoir.

2. Add brake fluid to the upper level mark on reservoir.

NOTE: Do not move foot brake lever when reservoir fluid level is low.

3. Begin bleeding procedure with the caliper that is farthest from the master cylinder. Install a wrench on the top caliper bleeder screw.

4. Attach a clean, clear hose to fitting and place the other end in a clean container. Be sure the hose fits tightly on fitting.

5. Slowly pump foot brake lever until pressure builds and holds.

6. While maintaining lever pressure, open bleeder screw. Close bleeder screw and release brake lever.

NOTE: Do not release lever before bleeder screw is tight or air may be drawn into caliper.

.

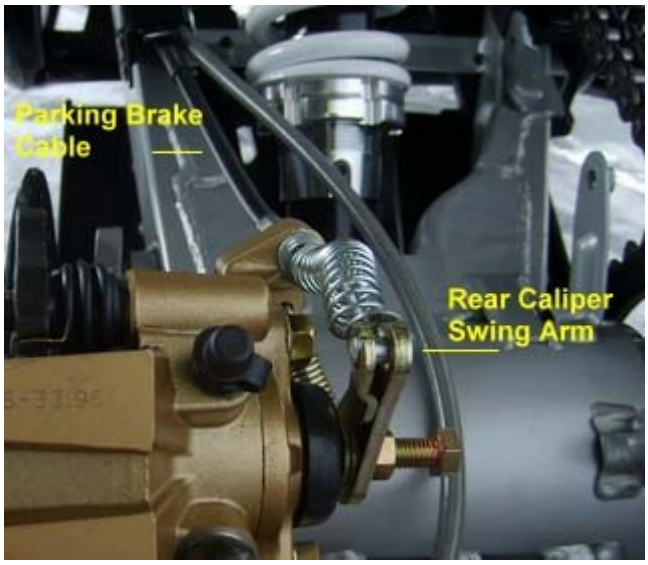
7. Repeat procedure until clean fluid appears in bleeder hose and all air has been purged. Add fluid as necessary to maintain level in reservoir.
NOTE: If brake pressure is hard to built, repeat breeding procedure with shunt breeding screw

8. Repeat procedure to 2 front caliper, foot brake lever and shunt until foot brake pressure built.
NOTE: Pump up the foot brake system pressure with the brake lever until lever resistance is felt.

⚠ CAUTION
Ensure the vent slot ring must face with cover when install oil tank diaphragm, vent slot ring and cover.

Parking brake removal

The parking brake system operates using mechanical brake cables. The left front parking brake lever operates the rear brake caliper swing arm to push caliper piston assembly.



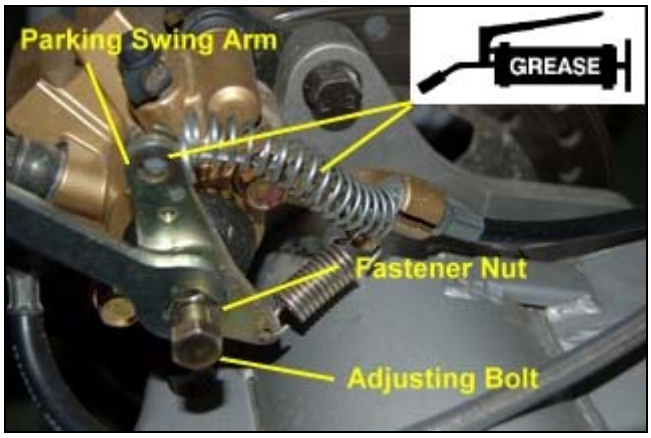
⚠ WARNING
When removing and installing the parking braking system. The spring may cause serious bodily injury.

⚠ CAUTION
Always wear safety glasses during these procedures.

1. Loosen the adjusting nut to the left end.

2. Remove the parking lever clamp blot, parking lever and left hand master cylinder as an assembly.

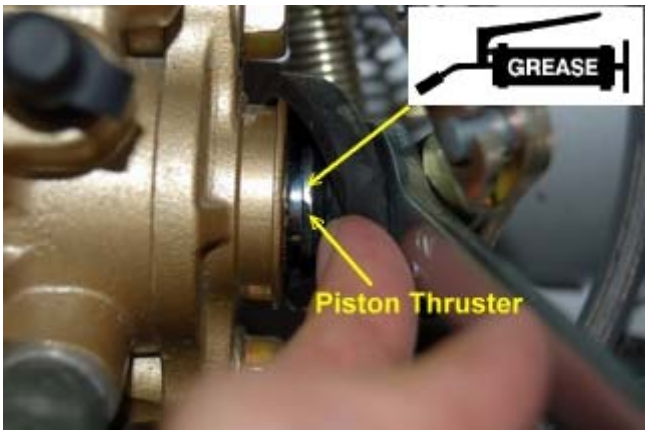
3. Loosen rear caliper fastener nut, adjusting bolt then remove swing arm.



4. Remove the return spring and cable from swing arm.

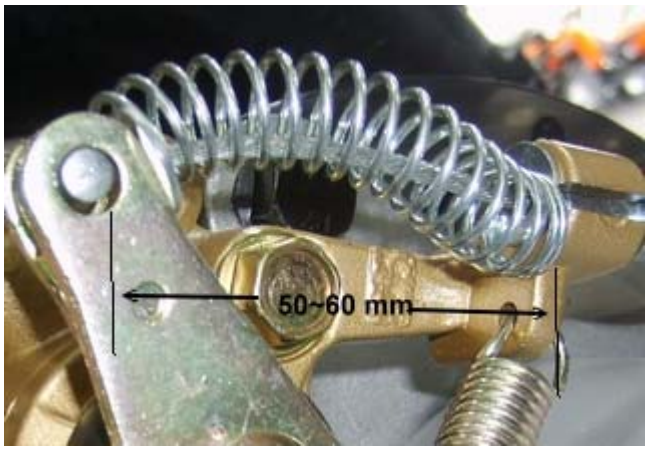
Parking brake installation, inspection and adjusting

1. Fully turn the piston thruster then loosen about 5mm back.



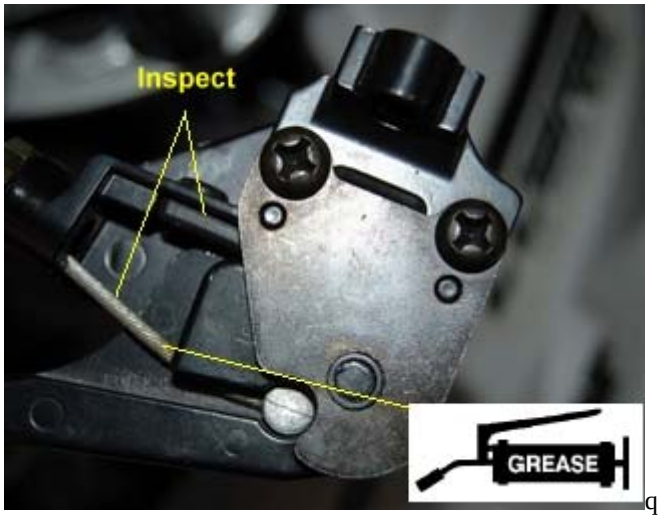
2. Replace rubber dust-proof if worn or cracked.

3. Install the both spring and swing to caliper.
4. Ensure the upper return spring 50~60mm with cable adapter.



5. Install the adjusting bolt and fastener nut an assembly.
6. Fully turn the adjusting bolt to end then loosen it 3/4 circuit. Fasten the nut present and security.

7. Inspect the parking lever cable and rubber pad, replace them if worn or damaged.



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8. Position the left hand master cylinder aligned with dot mark on handle bar.

9. Install parking lever on handlebars. Torque mounting bolts to **5Nm.** Torque the top bolt first.

BRAKE TROUBLESHOOTING

Brakes Squeal

◎ Dirty/contaminated friction pads
◎ Improper alignment
◎ Worn disc
◎ Worn disc spines
◎ Glazed brake pads

Poor Brake Performance

◎ Air in system
◎ Water in system (brake fluid contaminated)
◎ Caliper/disc misaligned
◎ Caliper dirty or damaged
◎ Brake line damaged or lining ruptured
◎ Worn disc and/or friction pads
◎ Incorrectly adjusted lever
◎ Incorrectly adjusted stationary pad
◎ Worn or damaged master cylinder or components
◎ Improper clearance between lever and switch

Lever Vibration

◎ Disc damaged
◎ Disc worn (run out or thickness variance exceeds service limit)
◎ Caliper Overheats (Brakes Drag)
◎ Compensating port plugged
◎ Pad clearance set incorrectly
◎ Auxiliary brake pedal incorrectly adjusted
◎ Brake lever or pedal binding or unable to return fully
◎ Parking brake left on
◎ Residue build up under caliper seals
◎ Operator riding brakes

Brakes Lock

◎ Alignment of caliper to disc
◎ Fluid overfill of the reservoir
◎ Stuck caliper piston

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ELECTRICAL

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GENERAL INFORMATION

Electrical System Service Notes

Reference the following notes when diagnosing electrical problems.

• Refer to wiring diagram for stator and electrical component resistance specifications.

• When measuring resistance of a component that has a low resistance value (under 10 Ohms), remember to subtract meter lead resistance from the reading.

Connect the leads together and record the resistance.

The resistance of the component is equal to tested value minus the lead resistance.

• Become familiar with the operation of the meter. Be sure leads are in the proper jack for the test being performed (i.e. 10A jack for current readings). Refer to the owner's manual included with the meter for more information.

• Voltage, amperage, and resistance values included in this manual are obtained with a Fluke™ 77 Digital Multimeter. This meter is acceptable for use when diagnosing electrical problems. Readings obtained with other meters may differ.

• Pay attention to the prefix on the multimeter reading (K, M, etc.) and the position of the decimal point.

• For resistance readings, isolate the component to be tested. Disconnect it from the wiring harness or power supply.

Wires color letter list

Letter	Color	Letter	Color
B	Black	L/Y	Blue/Yellow
B/L	Black/Blue	O	Orange
Br	Brown	O/B	Orange/Black
B/R	Black/Red	P	Pink
Br/L	Brown/Blue	Pu	Purple
Br/W	Brown/White	R	Red
B/Y	Black/Yellow	R/B	Red/Black
C	Cyan	R/W	Red/White
DB	Deep Brown	W	White
DG	Deep Green	WB	Water Blue
G	Green	W/B	White/Black
Gr	Gray	W/L	White/Blue
G/R	Green/Red	W/R	White/Red
G/W	Green/White	Y	Yellow

TRANSMISSION SWITCH SERVICE

Switch Removal/Test

1. Remove the CVT cover. The indicator switch will be visible between the drive and driven clutch.

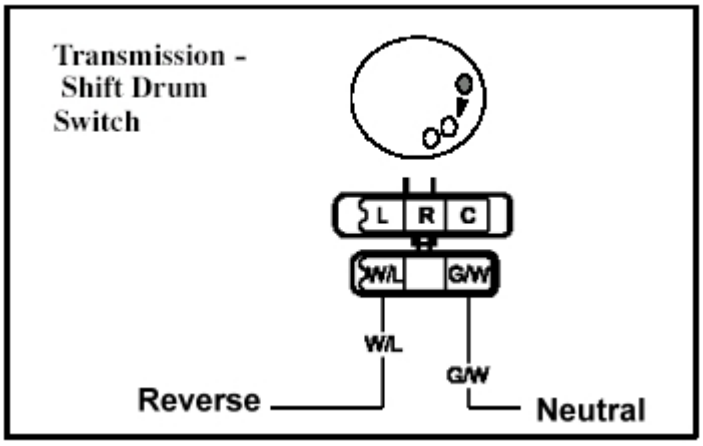
Refer to Chapter 3 for CVT cover removal and install.

2. Remove the screws that retain the indicator switch.

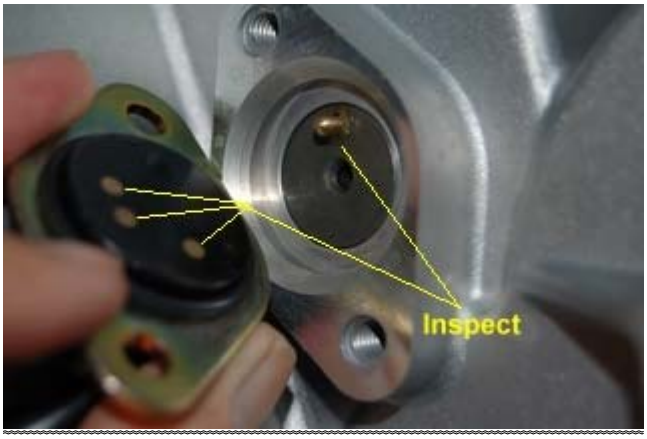
3. Using an ohmmeter, test for continuity between the switch contacts and connector leads.Replace the switch if no continuity or high resistance is found.

4. First, shift the transmission into "neutral" and test for continuity between the G/W wires and ground.

3. Then shift the transmission into "reverse" and test for continuity between the W/L wires and ground. In both tests you should have continuity to ground.



4. Inspect the shift indicator contacts, shift drum, pin and spring. Verify the pin is not sticking in the drum or is damaged. Replace any worn or damaged components.



Switch Installation

5. Once repairs are completed, reinstall the shift pin and spring into the shift drum (arrow). NOTE: assembly lube can be used to “stick” parts together for ease of assembly.

6. Install the indicator switch and o--ring (arrow), routing the wires in the same manner as during disassembly.

7. Install the retaining screws. Torque to **5Nm (45 in. lbs)**.

SWITCH SERVICE

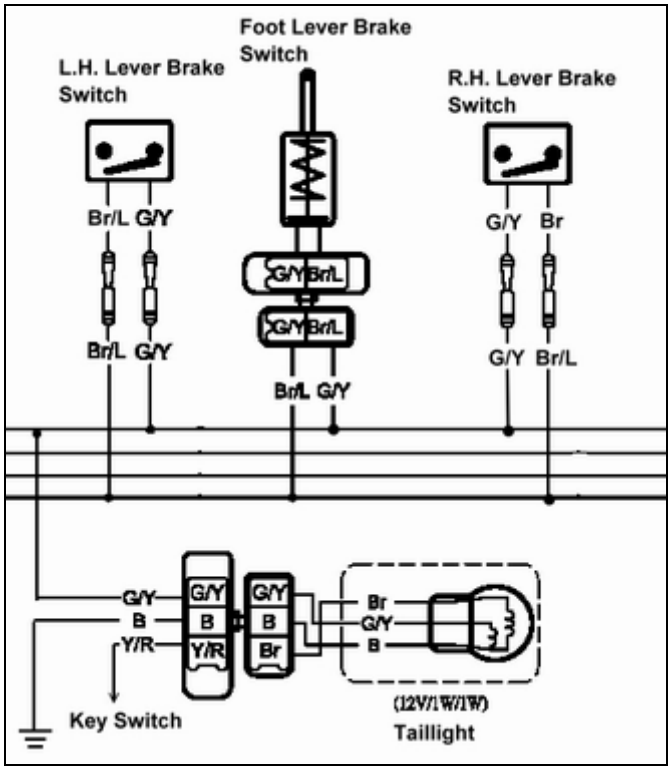
Brake Lever Switches

Each brake lever utilizes an electrical brake switch that sends voltage to activate the brake light.

1. Locate the brake switches on each of the brake levers.
2. Disconnect wire harness from brake switch and connect an ohmmeter across the two switch wires.

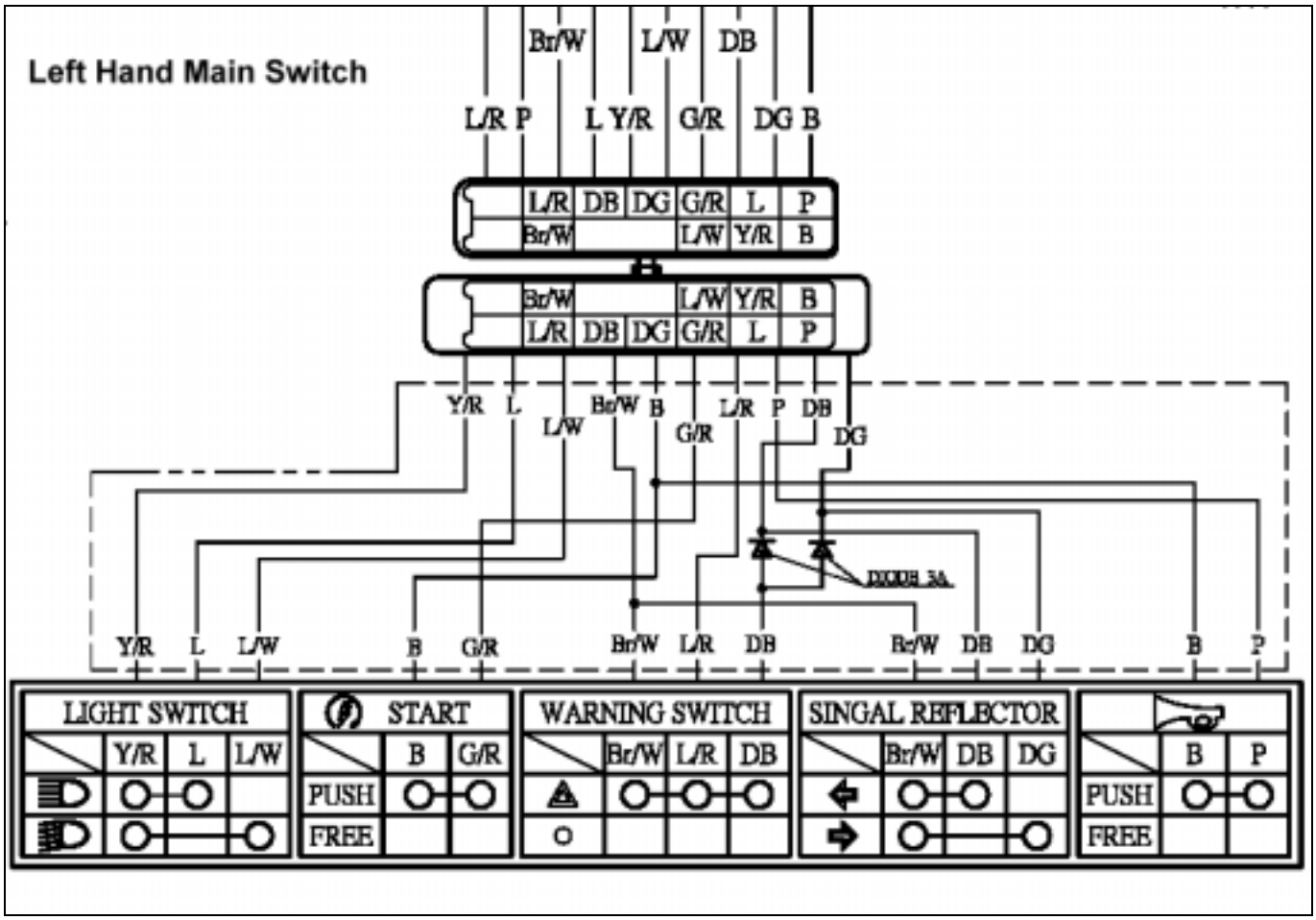
The reading should be infinite (•).

3. Apply brake the brake lever(s) and check for continuity between switch contacts. Replace switch if there is no continuity or if the resistance is greater than .5 ohms when the brake is applied with slight pressure.



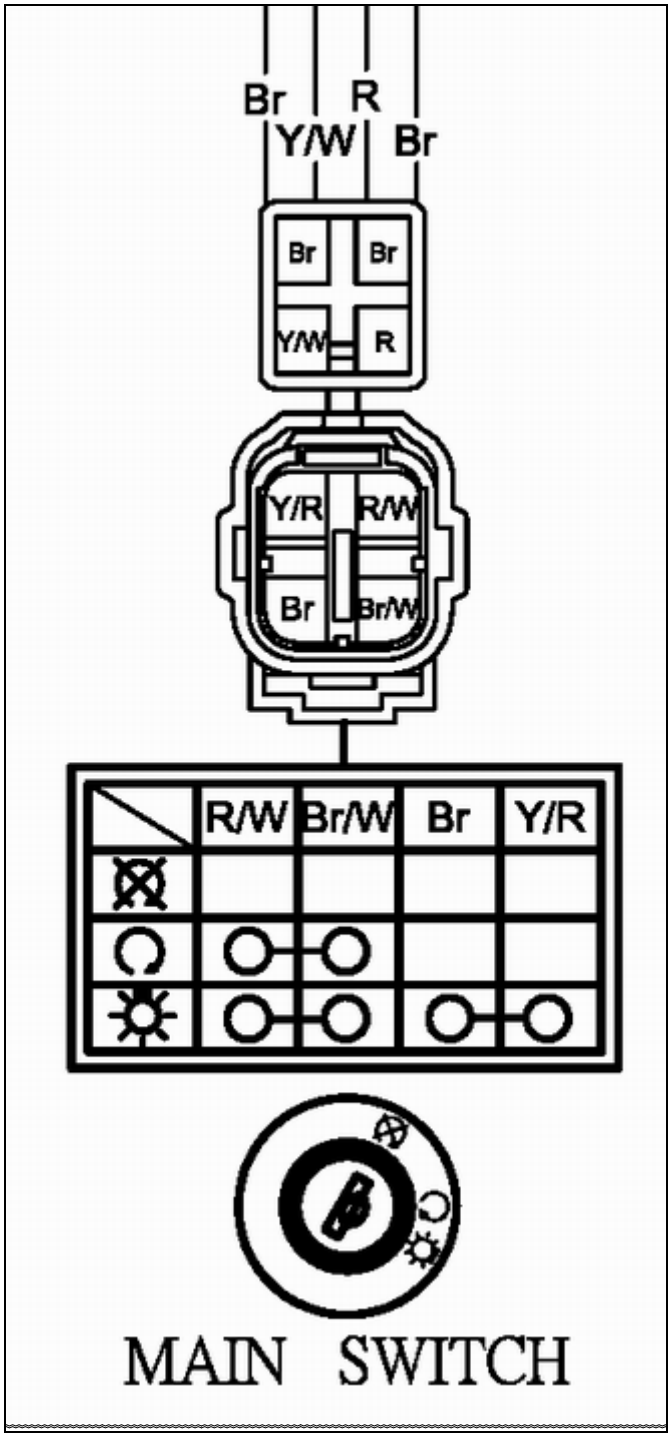
Left Hand Switch Assembly

The following illustration shows the internal operation of the
LH switch assembly. If any part of the switch is faulty, the entire LH switch assembly must be replaced.



Key Switch

The key switch can be tested with an ohm meter.



When the key switch is turned to the "ON" position, there should be continuity between the red/whore (R/W) and brown/white (Br/W) wires.

When the key is turned to the "OFF" position, there should no continuity between any of the wires.

When the key switch is turned to the " ☼ " position, there should be continuity between the red/whore (R/W) and brown/white (Br/W) wires. There should also be continuity between the brown (Br) and yellow/red (Y/R) wires.

The headlights are powered by an AC current from the Generator / Stator.

When headlight switch on but working, perform the following:

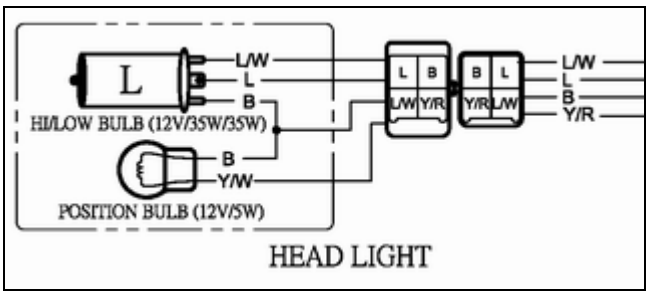
1. Disconnect the harness from the faulty light.
2. Using a Volt Ohm Meter, measure the AC voltage between the yellow red (YE/RD) and black (BK) wires. Voltage above 5 VAC should be present when unit is running.

If voltage is present:

1. Replace the faulty bulb.

If voltage is not present:

1. The black wire should have continuity to ground. If no continuity is present, check for an open in the wiring harness or a poor connection.
2. If black wire has good continuity to ground, check the wiring harness from the stator to the running lights. There should be continuity between the (Y/R) wire at the light connector and the (YE/RD) wire at the Generator / Stator.
3. If continuity is good. Perform stator resistance tests by using the resistance chart located in the wiring diagram.
4. Replace Generator / Stator if resistance is not within specification.

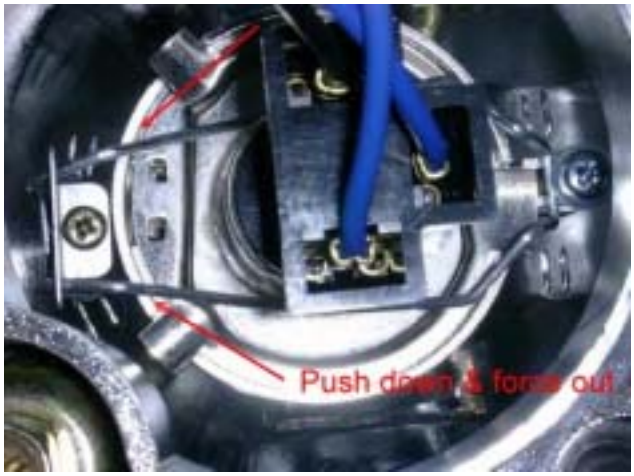


Headlight Lamp Replacement

If the headlights do not operate, lamp replacement may be required. Install only the recommended replacement lamps.

1. Remove the socket rubber seal.

2. Remove the socket rubber seal.



3. Remove the plug and replace bulb.

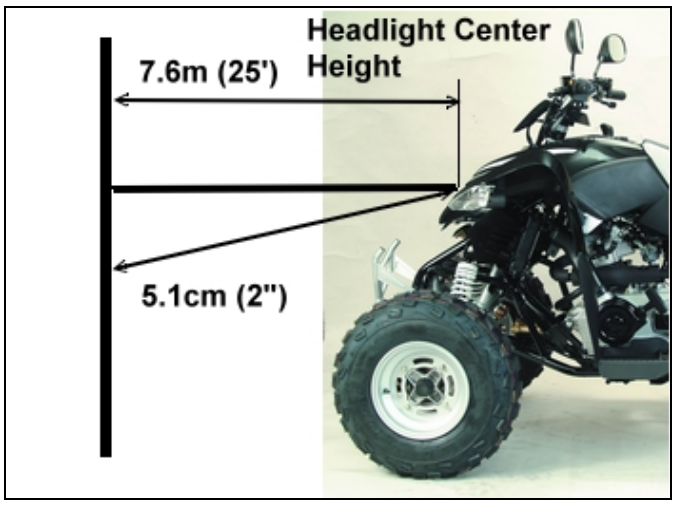
4. Pull the position bulb and replace it.

4. Reinstall the socket into the housing and Start the engine to make sure the lights come on. If the lights do not operate, check the charging system and related wiring for possible malfunction.

Headlight Adjustment

The headlight beam can be adjusted up and down and side to side.

1. Place the vehicle on a level surface with the headlight approximately 7.6 m (25') from a wall.



2. Measure the distance from the floor to the center of the headlight and make a mark on the wall at the same height.

3. Shift transmission to neutral, start the engine and turn the headlight switch to high beam.

4. Observe headlight aim. The most intense part of the headlight beam should be aimed 5.1 cm (2") below the mark placed on the wall.

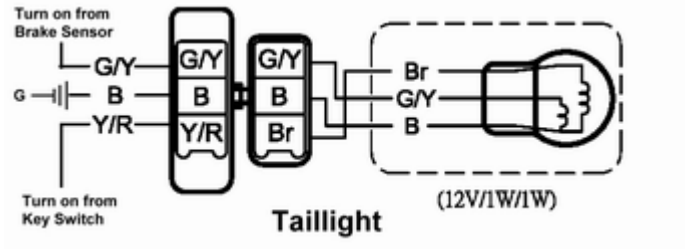
NOTE: Rider weight must be included on the seat. For machines with separate low beam lights, the drop should be 20.3 cm (8〃) in 25'.

5. Adjust beam to desired position by moving headlight.

Taillight

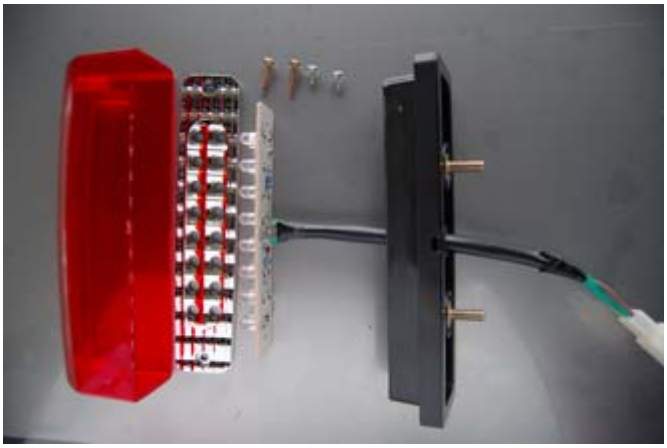
Taillight Lamp Replacement

If the tail light lamp does not work, the lamp may need to be replaced.



1. Remove the two screws securing the lens cover. Remove the lens cover.

2. Remove the LED lamp and replace it with a new recommended LED lamp. Apply Dielectric Grease to the lamp terminals.



3. Test the light for proper operation.

4. Reinstall the lens cover.

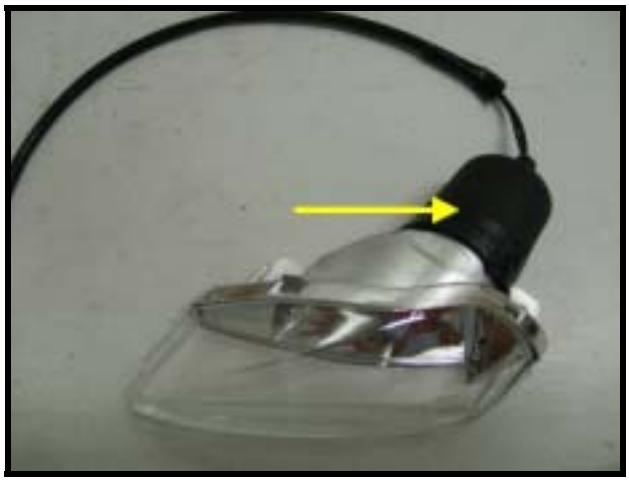
SIGNAL

Front Signal Replacement

If the headlights do not operate, lamp replacement may be required. Install only the recommended replacement lamps

1. Take off the front signal wire plug from harness.
2. Remove front signal and bracket from cab as picture.

3. Remove rubber waterproof cap.



4. Remove socket fastener screw and lamp socket.

5. Remove and replace lamp.

6. Reinstall all front signal components.

Rear Signal Replacement

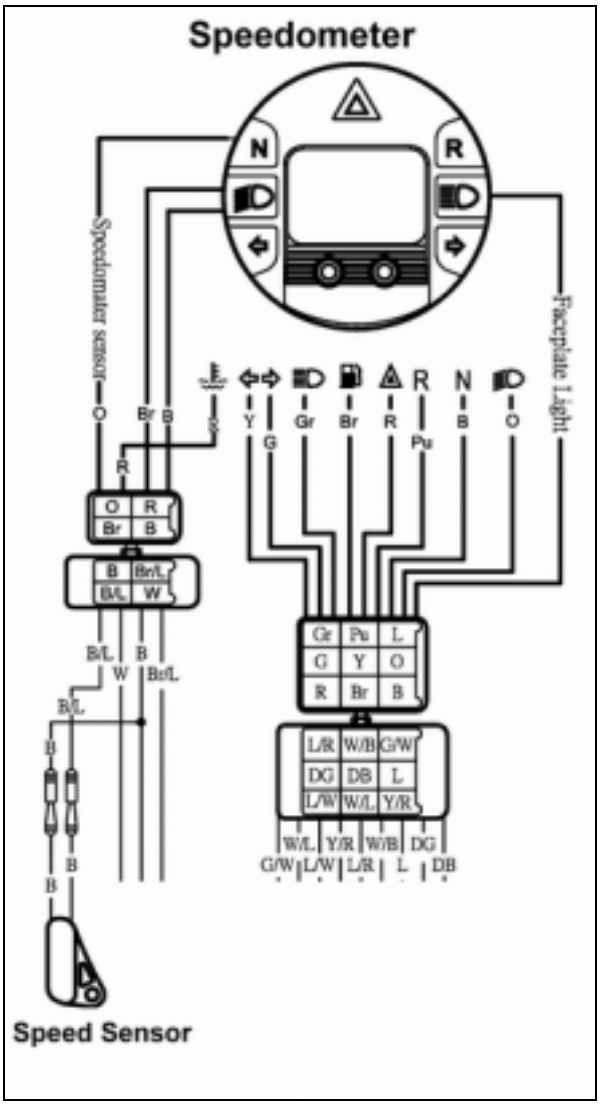
1. Remove rear signal and bracket from cab as picture.
2. Use small blade drive screw to remove lens.

3. Remove all components and replace lamp.

4. Reinstall all rear signal components.

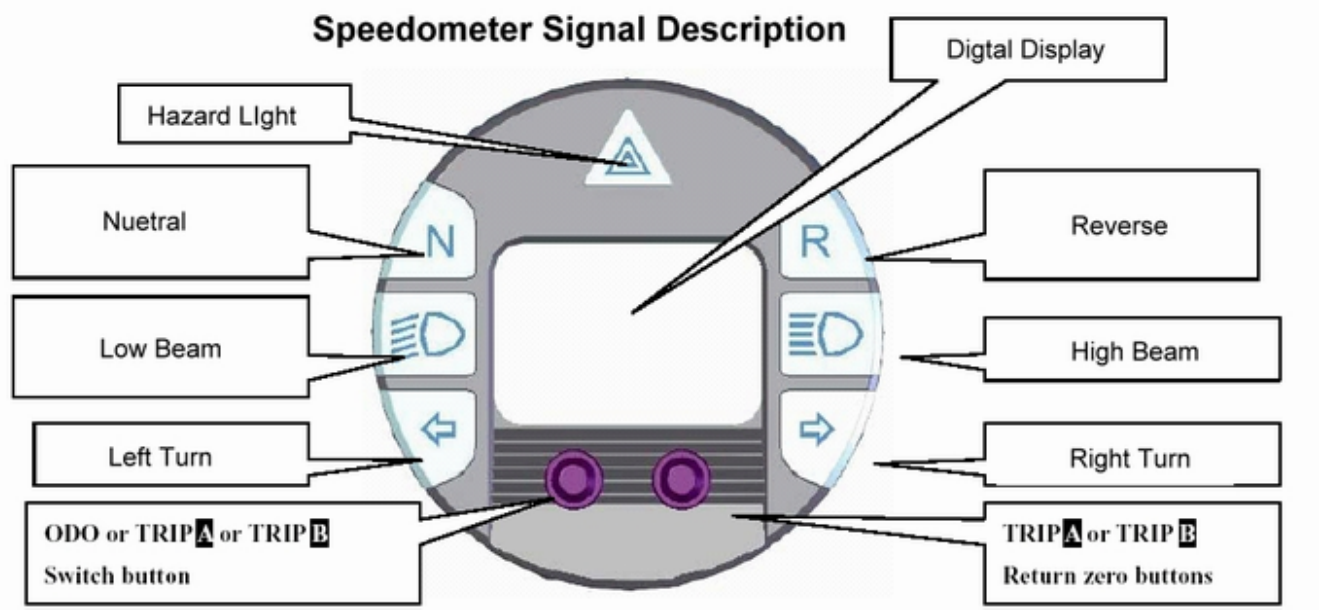
Speedometer and Indicator

Speedometer Replacement

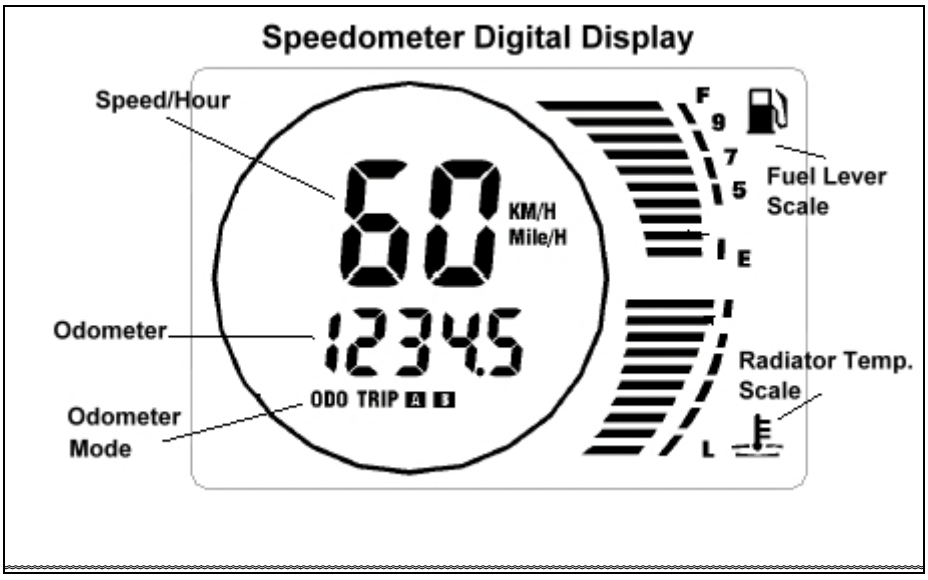


1. Remove the handlebar pod to access the speedometer.

2. Disconnect the speedometer wire connections from the harness.



Speedometer Digital Display Functional



1. Speed/ Hour: There are metric and English. Turn the key switch "off". Press both mode and zero button then turn "on" the key switch as show.

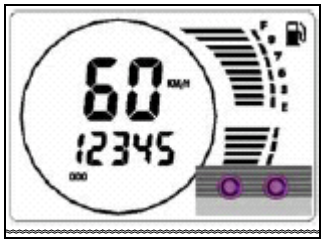
The KM/H and MILE/H symbol will twinkle. Press right button to select desire.

Press left button twice to finish selection.

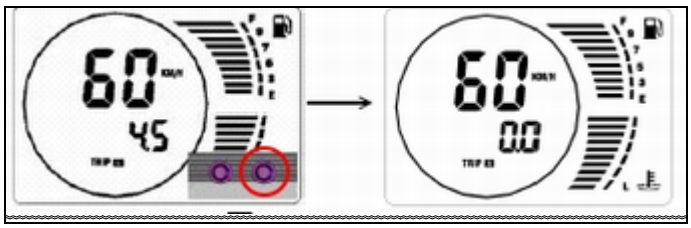
2. Odometer: It sum up total mileage that can't zero or delete anymore. But will change following KM/H and MILE/H selection.

3. Odometer mode: there are three modes ODO, TRIP and TRIP B.

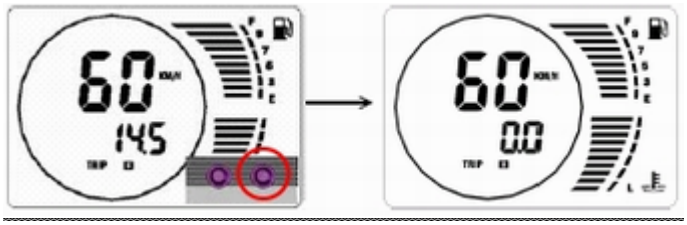
3.1 As item 2, in ODO you can't change anymore.



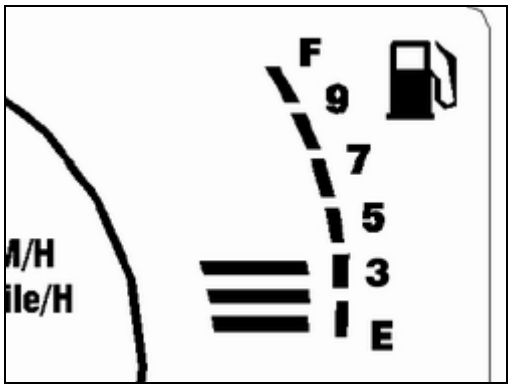
3.2 In "TRIP A" press "zero" button after two seconds to clear the mileage.



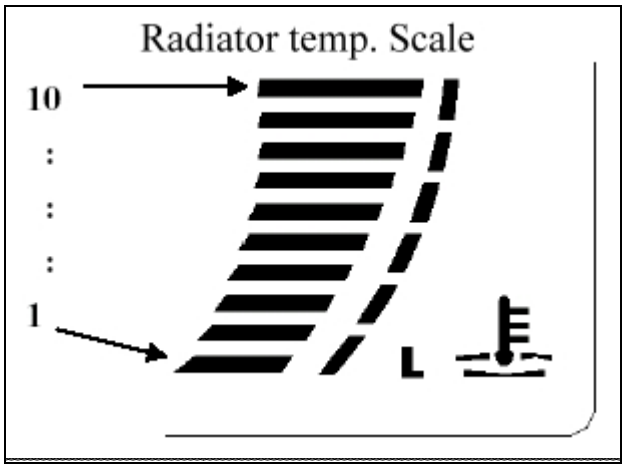
3.3 In "TRIP B" press "zero" button after two seconds to clear the mileage.



4. **Fuel lever scale:** The fuel symbol will be twinkling as lever display less than three.



5. Radiator temperature scale: There are 10 scales, the fan will start at 7th scale (80℃). The temperature table list as following.

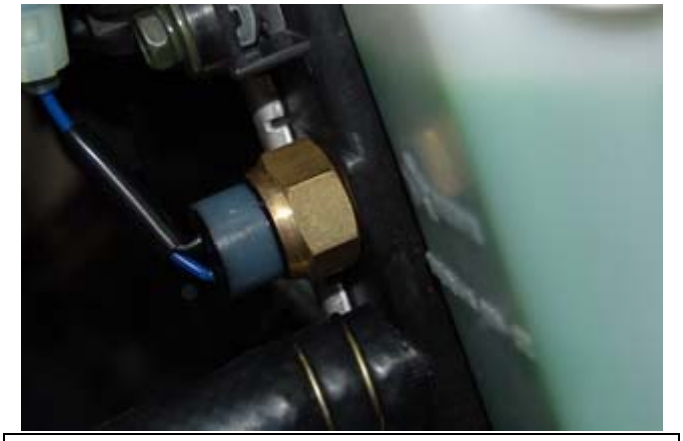


Scale	Range	Scale	Range
10	Over 105℃	4	49~58℃
9	101~104℃	3	39~48℃
8	89~100℃	2	29~38℃
7	79~88℃	1	19~28℃
6	69~78℃	0	Less 19℃
5	56~68℃		

⚠ CAUTION

The fan will start at scale 7th or 8th.
When scale full scale, stop vehicle immediately, inspects radiator water, thermostatic, bimetal valve and water pump.

The thermostatic sensor locates at right hand of the radiator.
If the sensor is faulty, replace the entire assembly.



⚠ WARNING

Do not open the radiator cap or remove sensor, hose, bimetal valve and water pump when the engine is still hot.

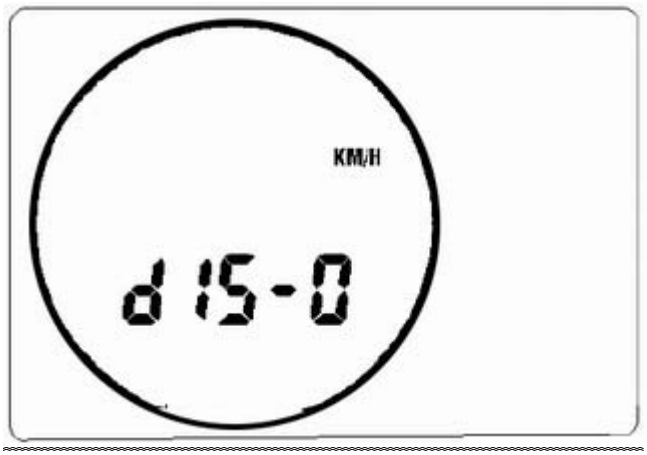
The Bimetal valve locates at right hand of cylinder.
If the valve is faulty, replace the entire assembly.

The water pump locates at right hand of crank cover.
The Remove and reinstall procedure referent as chapter 4.

6. Tire/ wheel diameter setting:

6.1 Turn the key switch “off”. Press both “mode” and “zero” button then turn “on” the key switch.

6.2 Press left button to select tire diameter as show twinkle.



6.2 Press right button to setting tire diameter. If you pass the desire number continue pressing right button it will repeat again.

The setting code from **d 15-0 to d 28-7.**

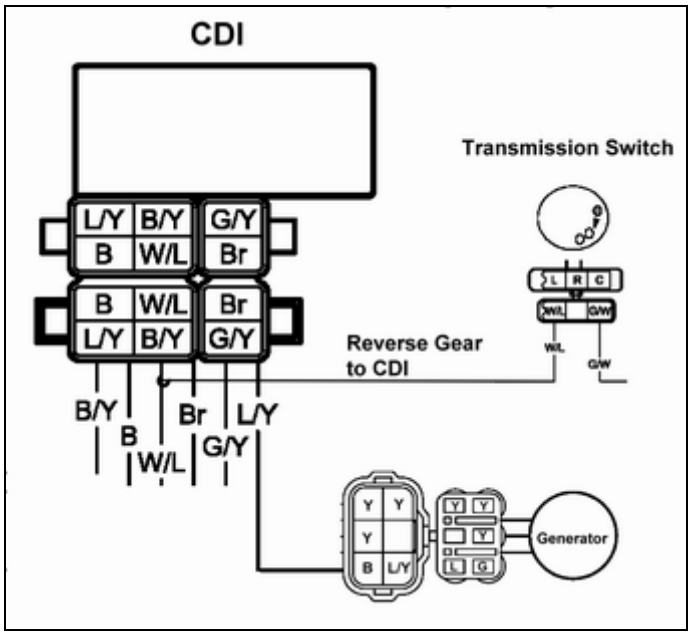
The setting code show as following table

Tire Spec.	Rim OD.	Tire OD.	Tire circle	Code
18x7-7	7 inch	457 mm	1436 mm	d 18-0
18x9.5-8	8 inch	459 mm	1441 mm	d 18-0
20x9-8	8 inch	508 mm	1595 mm	d 20-0
20x10-9	9 inch	508 mm	1595 mm	d 20-0
21-8-9	9 inch	536 mm	1683 mm	d 21-0
21x7-10	10 inch	536 mm	1683 mm	d 21-0
22x8-10	10 inch	561 mm	1763 mm	d 22-0
23x8-11	11 inch	588 mm	1842 mm	d 23-0

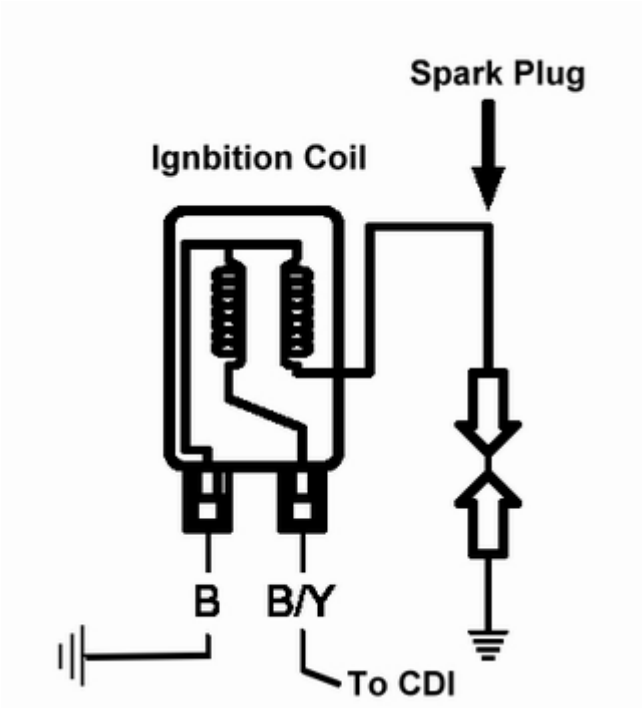
IGNITION SYSTEM

RPM LIMITER SPECIFICATIONS

NOTE: The ATV is limited through the CDI box located on the bulkhead under the front cab. In forward gear, the CDI reads the RPM's from the stator. The CDI acts as a limiter when the peak RPM is met. In Reverse Gear, the CDI also limits RPM, taking a signal from the shift drum switch that the vehicle is in reverse.



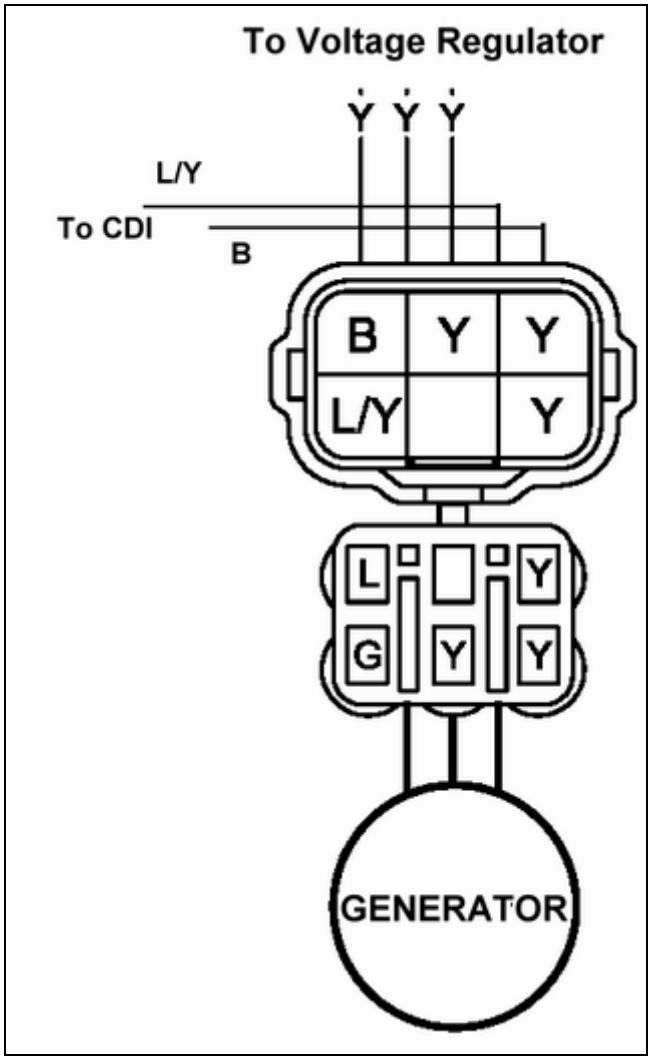
IGNITION COIL TESTING



Test Description	Resistance
Spade Connection to Ground	0.5 -- 1.0 Ohms
Plug Cap (Cap Resistance with Cap Removed)	4--5 K Ohms
Ignition Coil Secondary Winding (Cap Removed)	5--9 K Ohms

ALTERNATOR OUTPUT TEST (AC AMP)

Three tests can be performed using a multimeter to determine the condition of the stator (alternator).



TEST 1: Resistance Value of Each Stator Leg

1. Measure the resistance value of each of the three stator legs: Y1 to Y2, Y1 to Y3, and Y2 to Y3.

Each should measure **0.7--1.0 ohms**

2. When measuring any of the Yellow wires to ground, the reading should be infinite (open).

NOTE: If there are any significant variations in ohm's readings between the three legs; it is an indication that one of the three stator legs maybe weak or failed.

TEST 2:Resistance Value of Stator Leg to Ground

1. Measure the resistance value of each of the stator legs to ground: Y1 to Ground, Y2 to Ground, Y3 to Ground.

NOTE: Any measurement other than Infinity (open) will indicate a failed or shorted stator leg.

TEST 3: Measure AC Voltage Output of Each Stator Leg at Charging RPM with a voltmeter set to Volts AC.

1. Place the red lead on the tester in the 10A jack.
2. Turn the selector dial to the Volts AC position.
3. Start the engine and let it idle.
4. Separately test each 'leg' of the stator by connecting the meter leads to the wires leading from the alternator (Y1 to Y2, Y1 to Y3, Y2 to Y3).

Alternator Current Output Reading should be no less than **30--40V AC above 2000 RPM on each 'leg'**.

NOTE: If one or more of the stator leg output AC voltage varies significantly from the specified value, the stator may need to be replaced.

CDI OUTPUT TEST USING PEAK READING ADAPTOR OR A VOLT METER

Re-connect all CDI wires to stator wires. Disconnect CDI module wire from ignition coil primary terminal. Connect one meter lead to engine ground and the other to the ignition coil primary wire leading from the CDI module. Crank engine and check output of CDI wire to coil. Reconnect coil wire to CDI.

Test	Connect meter wire to:	Reading
CDI output	B/Y to Engine Ground	240DC Volts ± 20%

CDI OUTPUT TEST USING PEAK READING ADAPTOR

Re-connect all CDI wires to stator wires. Disconnect CDI module wire from ignition coil primary terminal. Connect one meter lead to engine ground and the other to the ignition coil primary wire leading from the CDI module. Set meter to read DC Volts. Crank engine and check output of CDI wire to coil.

Average Output w/ Digital Voltmeter
20 DCV

CDI CRANKING OUTPUT TEST

The following peak voltage tests will measure the amount of output directly from each component. A peak reading voltmeter can be used to perform the tests. A variety of peak reading adaptors are commercially available for use with the Fluket 77 DigitalMultimeter and other digital VOMs, which will allow peak voltage tests to be performed accurately. Follow the directions provided with the adaptor. All measurements are indicated in Volts. Readings obtained without a peak reading adaptor will be significantly different.

Disconnect the stator connectors from the CDI module. Test output from the detection and pulse (trigger) coil, and compare to the chart. The following measurements were obtained when cranking the engine with the electric starter, spark plug installed.

The starter system must be in good condition and the battery fully charged.

210 Watt 4 Stroke CDI Ignition

Voltage Test	**Connect Meter Wires To:**	**Reading (With VOM)**	**Reading (With Peak Reading Adapter)**
Pulse Coil	L/Y and G	0.15 Volts minimum AC @ cranking RPM	1.4--2.0 Volts minimum DC @ cranking RPM

Ohm Test	**Connect Meter Wires To:**	**Reading**	**Reading With Peak Reading Adapter)**
Pulse Coil	L/Y and G	120--180 Ohms	n/a

CDI WIRES

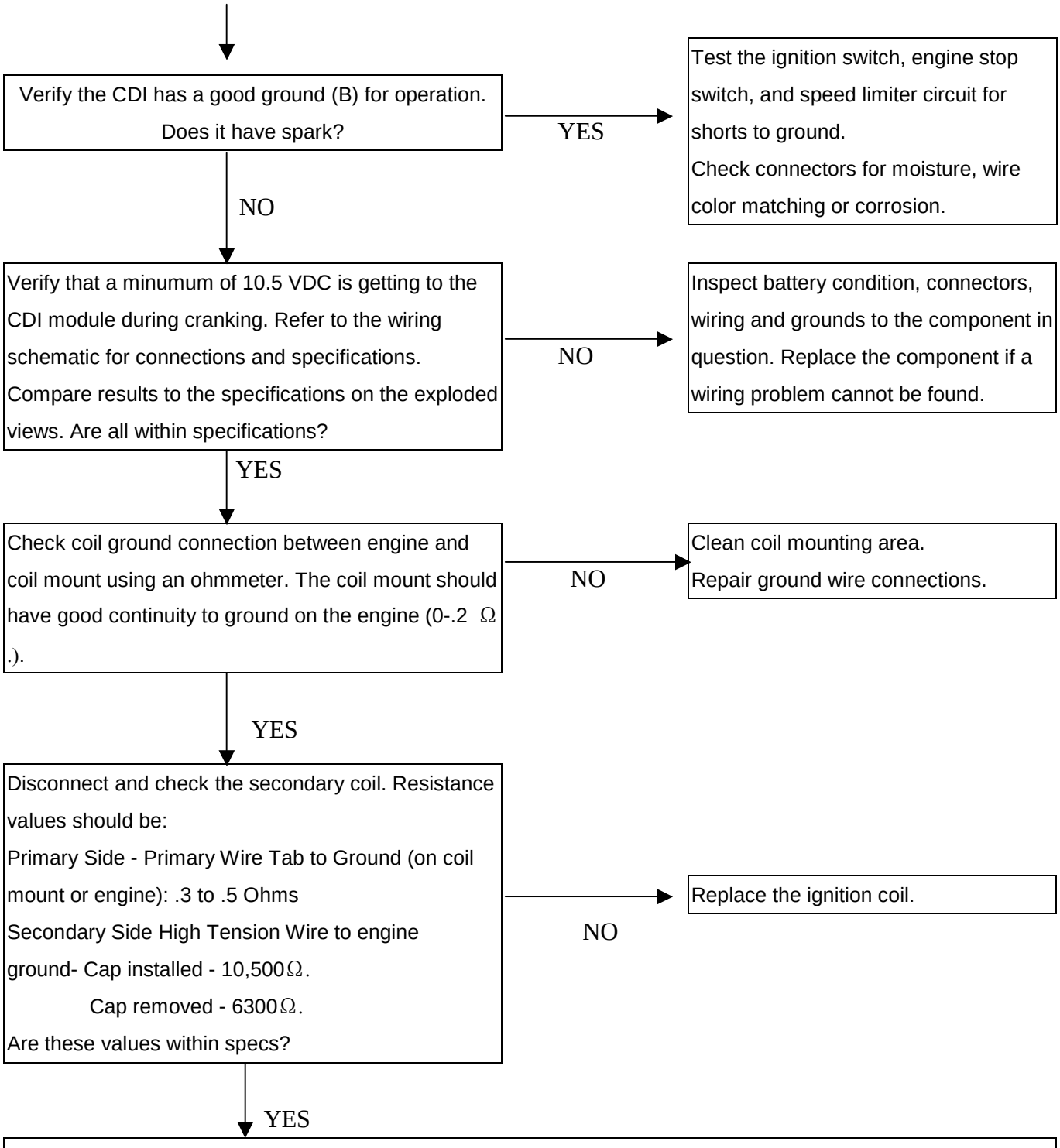
PLUG	**COLOR**	**DECCRIPTION**
2-WIRE	Br	DC VOLTAGE INPUT.
	G/Y	BRAKE LIGHT SIGNAL
4-WIRE	B/Y	IGNITION COIL DC OUTPUT.
	W/ L	REVERSE SIGNAL
	B	GROUND
	L/Y	PULSE COIL INPUT

IGNITION SYSTEM TESTING

Whenever troubleshooting an electrical problem you should first check all terminal connections to be sure they are clean and tight. Also be sure that colors match when wires are connected. Use the following pages as a guide for troubleshooting. The resistance values are also given on the specification pages.

Condition: No Spark or intermittent spark

Verify 12 Volt DC power is present on the wire to CDI. Replace Spark Plug.


Verify the CDI has a good ground (B) for operation. Does it have spark?
YES
Test the ignition switch, engine stop switch, and speed limiter circuit for shorts to ground. Check connectors for moisture, wire color matching or corrosion.
NO
Verify that a minumum of 10.5 VDC is getting to the CDI module during cranking. Refer to the wiring schematic for connections and specifications. Compare results to the specifications on the exploded views. Are all within specifications?
NO
Inspect battery condition, connectors, wiring and grounds to the component in question. Replace the component if a wiring problem cannot be found.
YES
Check coil ground connection between engine and coil mount using an ohmmeter. The coil mount should have good continuity to ground on the engine (0-.2 Ω .).
NO
Clean coil mounting area. Repair ground wire connections.
YES
Disconnect and check the secondary coil. Resistance values should be:
Primary Side - Primary Wire Tab to Ground (on coil mount or engine): .3 to .5 Ohms
Secondary Side High Tension Wire to engine ground- Cap installed - 10,500Ω.
Cap removed - 6300Ω.
Are these values within specs?
NO
Replace the ignition coil.
YES
If all of the above tests are within specifications, and all grounds, connections, and wire color-coding have been inspected, perform voltage output tests on following page or replace the CDI module.

No Spark, Weak or Intermittent Spark

◎ No12 volt power or ground to CDI

◎ Spark plug gap incorrect

◎ Fouled spark plug

◎ Faulty spark plug cap or poor connection to high tension lead

◎ Related wiring loose, disconnected, shorted, or corroded

◎ Engine Stop switch or ignition switch faulty

◎ Poor ignition coil ground (e.g. coil mount loose or corroded)

◎ Faulty stator (measure resistance of all ignition related windings)

◎ Incorrect wiring (inspect color coding in connectors etc)

◎ Faulty ignition coil winding (measure resistance of primary and secondary)

◎ Worn magneto (RH) end Crankshaft bearings

◎ Sheared flywheel key

◎ Flywheel loose or damaged

◎ Excessive crankshaft runout on magneto (RH) end - should not exceed .005〃

◎ Faulty CDI module

CHARGING SYSTEM

MAIN FUSE ASSEMBLY

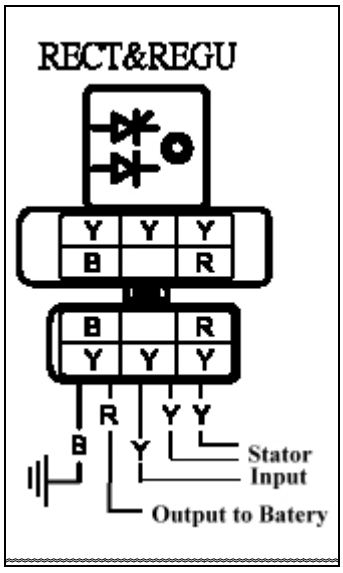
The main fuse assembly is located under the seat and has a 15-amp capacity.

NOTE: Use only the recommended fuse capacity, as use of a higher amperage fuse to correct blown—fuse situations could lead to electrical component damage.

Voltage Regulator / Rectifier

1. The voltage regulator / rectifier is located under the headlight of right hand front cab.

2. If a problem exists with the charging system, test the components around the regulator/rectifier to isolate the component. If the stator is supplying sufficient AC current and there is no DC current leaving the regulator/rectifier, replace the component.



Charging System Testing

Whenever charging system problems are suspected, proceed with the following system checks:

Using a multitester set on D.C. volts, measure the battery open circuit voltage (see procedure later in chapter). It should be 12.4 volts or more. Is it?

NO → Remove the battery and properly service. Reinstall the fully charged battery or a fully charged shop battery.

YES ↓

Meter Setting: DC Volts
With the transmission in neutral, start the engine and increase RPM to between 3000 and 4000. Read battery voltage with the voltmeter. Voltage readings should start to increase towards 13.0 V D.C. Was an increase noticed?

YES → Check Key off Current Draw
Refer to Page 9.18.

NO ↓

Perform system **"Break Even Amperage"** test outlined on Page 9.18.
Does charging occur as specified?
Meter Setting: DC Amps

YES → Check for owner modification, and discuss operating habits. The battery will continually discharge if operated below the "Break Even" RPM. Continued problems would call for battery inspection.

NO ↓

Disconnect the wires leading from the regulator/ rectifier. Using a multitester, perform an **Alternator Output (AC amp) test**. See test procedure on Page 9.18 for procedure.
Is output above 5 amps?

NO → Inspect the wiring harness between the panel and the stator for damage. If no damage is found, remove the recoil and flywheel.
Inspect the flywheel magnets, stator coils and stator wire harness for damage. Repair or replace any damaged components.

YES ↓

Meter Setting: DC Volts
Reconnect the alternator wires. Note: Red wire must be connected to harness. Battery voltage must be present on red wire terminal on harness side of voltage regulator connector.
Is it?

YES → Check regulator/rectifier connections and ground, battery connections, circuit breaker and connecting wires. Repair or replace faulty wiring or components.

If all of the previous tests indicate a good condition, but the charging voltage does not rise above battery voltage at the connector or terminal board, replace the voltage regulator.

CURRENT DRAW - KEY OFF

⚠ CAUTION

Do not connect or disconnect the battery cable or ammeter with the engine running. Damage will occur to light bulbs and speed limiter.

Connect an ammeter in series with the negative battery cable. Check for current draw with the key off.
If the draw is excessive, loads should be disconnected from the system one by one until the draw is eliminated. Check component wiring as well as the component for partial shorts to ground to eliminate the draw.

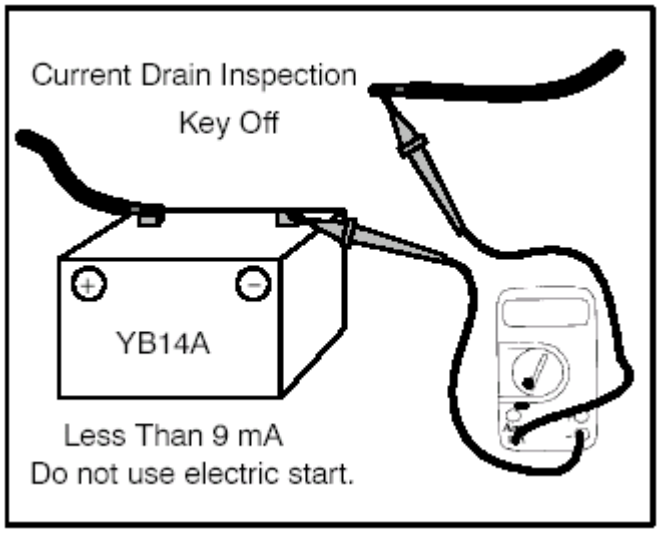
Current Draw - Key Off:
Maximum of .02 DCA (20 mA)

⚠ CAUTION

Do not connect or disconnect the battery cable or ammeter with the engine running. Damage will occur to light bulbs and speed limiter.

The "break even" point of the charging system is the point at which the alternator overcomes all system loads (lights, etc.) and begins to charge the battery. Depending on battery condition and system load, the break even point may vary slightly. The battery should be fully charged before performing this test.

◎ Clamp an inductive ammeter or connect an ammeter (set to DC amps) in series between the negative battery cable and terminal.



◎ Connect a tachometer according to manufacturer's instructions.

◎ With engine off and the key and kill switch in the ON position, the ammeter should read negative amps (battery discharge). Reverse meter leads if a positive reading is indicated.

◎ Shift transmission into neutral and start the engine. **If using an ammeter in series, start engine with kick start *only.***

◎ Turn headlight on high beam and apply the brake light. Increase engine RPM while observing ammeter and tachometer.

◎ Note RPM at which the battery starts to charge (ammeter indication is positive).

◎ With lights and other electrical load off, this should occur at approximately 1500 RPM or lower.

◎ Turn the lights on and lock parking brake to keep brake light on.

◎ Repeat test, observing ammeter and tachometer. With lights on, charging should occur at or below 2000 RPM.

ALTERNATOR OUTPUT TEST (AC AMP)

This test measures AC amperage from the alternator.

⚠ CAUTION

This test simulates a "full load" on the alternator. Do not perform this test longer than required to obtain a reading or the alternator stator windings may overheat. Do not exceed idle rpm during this test.

To Calculate Available Alternator Output
I=P/E, 150W / 12V = 12.5 Amps I =
I = Current in Amps
P = Power in Watts
E = Electromotive Force (Volts)

Alternator Current Output:
Minimum of 5 AC Amps

◎ Maximum alternator output will be indicated on the meter. It is *not* necessary to increase engine RPM above idle.

◎ Place the red lead on the tester in the 10A jack.

◎ Turn the selector dial to the AC amps position.

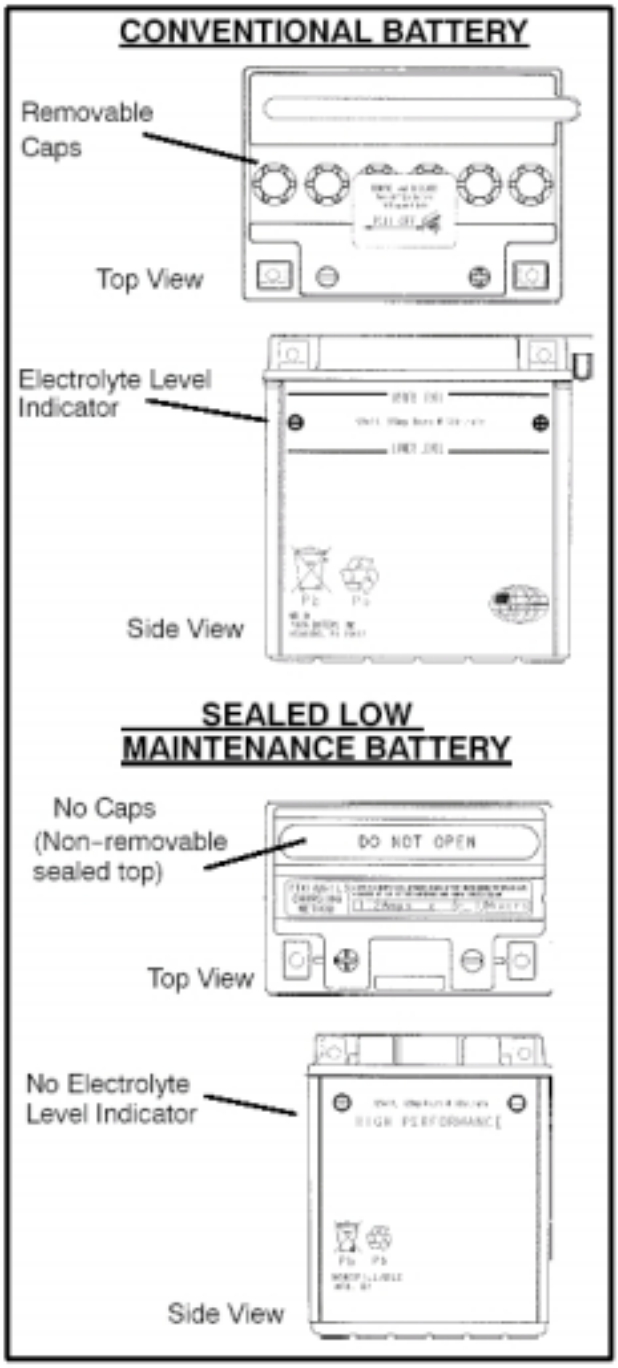
◎ Connect the meter leads to the wires leading from the alternator (see schematic for proper wiring colors).

◎ Start the engine and let it idle. Reading should be a minimum of 5A at idle.

BATTERY

BATTERY IDENTIFICATION

NOTICE: It is important to identify what type of battery you have installed in your ATV. Different types of batteries require different service procedures.
Proper servicing and upkeep of your battery is very important for maintaining long battery life.
Your ATV may have a Conventional Battery or a Sealed Low Maintenance Battery. To identify which type of battery your ATV has, refer to the illustration below and follow the correct service and charging procedures that follow in the manual.



SEALED LOW MAINTENANCE BATTERY

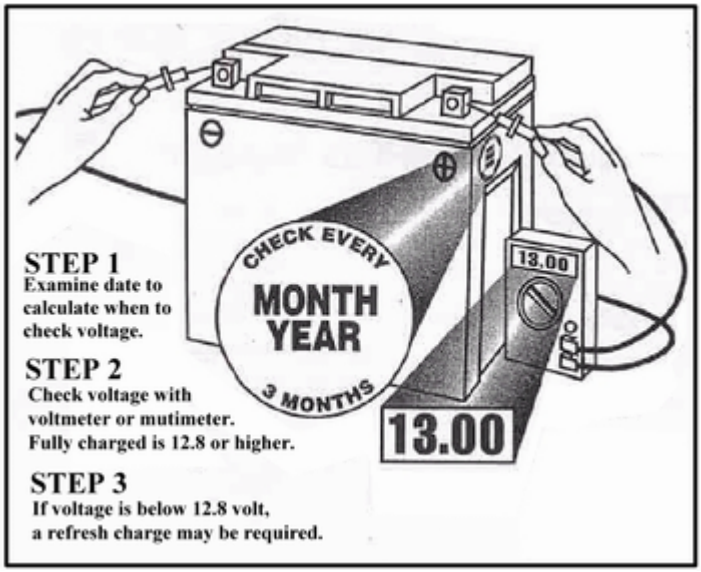
NOTE: All Low Maintenance batteries are fully charged and tested at the factory before installation. Expected shelf life varies upon storage conditions. As a general rule before placing the battery into service, check the battery condition and charge accordingly.

Battery Check:

1. Check the date label on the side of the battery to calculate when to check voltage. The battery should be checked every 3 months.
2. Check the voltage with a voltmeter or multimeter.

A fully charged battery should be 12.8 V or higher.

3. If the voltage is below 12.8 V, the battery will need to be recharged.



New Batteries: Batteries must be fully charged before use or battery life can be reduced by 10-30% of full potential. **Charge battery for 3—5 hours using a variable rate charger. Do not use the alternator to charge a new battery. A high rate battery charger can cause battery damage.**

Low Maintenance batteries are permanently sealed at the time of manufacture. The use of lead--calcium and AGM technology instead of lead--antimony allows the battery acid to be fully absorbed. For this reason, a Low Maintenance battery case is dark and the cell caps are not removable, since there is no need to check electrolyte level.

NEVER attempt to add electrolyte or water to a Low Maintenance battery. Doing so will damage the case and shorten the life of the battery. Refer to the Battery Activation and Maintenance Video (PN 9917987) for proper instruction on servicing Low Maintenance batteries.

NEVER attempt to add electrolyte or water to a Low Maintenance battery. Doing so will damage the case and shorten the life of the battery. Refer to the Battery Maintenance Video (PN 9917987) for proper instruction on servicing Low Maintenance batteries.

How To service a Low Maintenance battery:

1. Remove battery from the vehicle
2. Test battery with a voltage meter or load tester to determine battery condition. This will determine the length of time required to charge the battery to full capacity. Refer to capacity table.
3. Charge battery using a variable rate charger.

SEALED LOW MAINTENANCEBATTERY CHARGING

If battery voltage is 12.8 V or less, the battery may need recharging. When using an automatic charger, refer to the charger manufacturer's instructions for recharging. When using a constant current charger, use the following guidelines for recharging.

NOTE: Always verify battery condition before and 1-2 hours after the end of charging.

WARNING: An overheated battery could explode, causing severe injury or death. Always watch charging times carefully. Stop charging if the battery becomes very warm to the touch. Allow it to cool before resuming charging.

Battery Charging Reference Table

State of Charge	VOLTAGE	ACTION	CHARGE TIME
100%	12.8-13.0V	None	FULL None Required
75%	12.5-12.8V	Slight Charge	3-6 Hours @ 0.5 A
50%	12-12.5V	Charge	5-11 Hours @ 0.5 A
25%	11.5-12.0V	Charge	13+ Hours @ 0.5 A Check Charging
0%	Less than 11.5v	Charge	20 Hours @ 0.5 A Battery may be dead

SEALED LOW MAINTENANCE BATTERY INSPECTION/ REMOVAL

The battery is located under the seat.

1. Disconnect holder strap..
2. Disconnect battery negative (-) (black) cable first, followed by the positive (+) (red) cable.

⚠ CAUTION
Whenever removing or reinstalling the battery, disconnect the negative (black) cable first and reinstall the negative cable last!

3. Remove the battery.

SEALED LOW MAINTENANCE BATTERY INSTALLATION

1. Clean battery cables and terminals with a stiff wire brush. Corrosion can be removed using a solution of one cup water and one tablespoon baking soda. Rinse well with clean water and dry thoroughly.
2. Route the cables correctly.
3. Reinstall battery, attaching positive (+) (red) cable first and then the negative (-) (black) cable. Coat terminals and bolt threads with Grease.
4. Reinstall the holder strap.

SEALED LOW MAINTENANCE BATTERY TESTING

Whenever a service complaint is related to either the starting or charging systems, the battery should be checked first. Following are three tests which can easily be made on a battery to determine its condition: OCV Test, Specific Gravity Test and Load Test.

SEALED LOW MAINTENANCE BATTERY -- OCV – OPEN CIRCUIT VOLTAGE TEST

Battery voltage should be checked with a digital multitester. Readings of 12.8 volts or less require further battery testing and charging. See charts and Load Test.

NOTE: Lead-acid batteries should be kept at or near a full charge as possible. If the battery is stored or used in a partially charged condition, or with low electrolyte levels, hard crystal sulfation will form on the plates, reducing the efficiency and service life of the battery.

NOTE: Use a voltmeter or multimeter to test batter voltage.

OPEN CIRCUIT VOLTAGE		
State of charge	Maintenance Free	Low Maintenance Type
100%	13.0V	12.70V
75% Charged	12.80V	12.50V
50% Charged	12.50V	12.20V
25% Charged	12.20V	12.0V
0% Charged	Less than 12.0V	Less than 11.9V

* At 28℃

NOTE: Subtract .01 from the specific gravity reading at 0℃.

SEALED LOW MAINTENANCE BATTERY LOAD TEST

⚠ CAUTION
Whenever removing or reinstalling the battery, disconnect the negative (black) cable first and reinstall the negative cable last!

NOTE: This test can only be performed on machines with electric starters. This test cannot be performed with an engine or starting system that is not working properly.

A battery may indicate a full charge condition in the OCV test and the specific gravity test, but still may not have the storage capacity necessary to properly function in the electrical system. For this reason, a battery capacity or load test should be conducted whenever poor battery performance is encountered. To perform this test, hook a multitester to the battery in the same manner as was done in the OCV test. The reading should be 12.6 volts or greater. Engage the starter and observe the battery voltage while cranking the engine. Continue the test for 15 seconds. During cranking the observed voltage should not drop below 9.5 volts. If the beginning voltage is 12.6 volts or higher and the cranking voltage drops below 9.5 volts during the test, replace the battery.

SEALED LOW MAINTENANCE BATTERY OFF—SEASON STORAGE

To prevent battery damage during extended periods of non-use, the following basic battery maintenance items must be performed:

◎ Remove the battery from the machine and wash the case and battery tray with a mild solution of baking soda and water. Rinse with lots of fresh water after cleaning.

◎ Using a wire brush or knife, remove any corrosion from the cables and terminals.

◎ Charge at a rate no greater than 1/10 of the battery's amp/hr capacity until the voltage reaches 13.0VDC or greater.

◎ Store the battery either in the machine with the cables disconnected, or store in a cool place.

NOTE: Stored batteries lose their charge at the rate of up to 1% per day. Recharge to full capacity every 30 to 60 days during a non-use period. If the battery is stored during the winter months, electrolyte will freeze at higher temperatures as the battery discharges. The chart below indicates freezing points by specific gravity.

Electrolyte Freezing Points	
Specific Gravity of Electrolyte	Freezing Point
1.265	-80℃ (-75° F)
1.225	-37℃ (-35° F)
1.200	-27℃ (-17° F)
1.150	-15℃ (+5° F)
1.100	-8℃ (+18° F)
1.050	-3℃ (+27° F)

SEALED LOW MAINTENANCE BATTERY CHARGING PROCEDURE

1. Remove the battery from the ATV to prevent damage from leaking or spilled acid during charging.
2. Charge the battery with a variable rate charging output. Charge as needed to raise the voltage to 12.8VDC or greater.
3. Install battery in vehicle with positive terminal toward the front. Coat threads of battery bolt with a corrosion resistant Grease.
4. Route cables so they are tucked away in front and behind battery.
5. Connect battery cables.

⚠ WARNING

To avoid the possibility of sparks and explosion, connect positive (red) cable first and negative (black) cable last.

6. After connecting the battery cables, install the cover on the battery and attach the hold down strap.

CONVENTIONAL BATTERY ACTIVATION/ SVC

To ensure maximum service life and performance from a battery, perform the following steps.

NOTE: This section contains information for both conventional Lead--Acid batteries and Sealed Low Maintenance batteries. Before service, identify the battery type in the vehicle. Use the section that applies to the battery.

⚠ WARNING

Battery electrolyte is poisonous. It contains sulfuric acid. Serious burns can result from contact with skin, eyes or clothing. Antidote:

External: Flush with water.

Internal: Drink large quantities of water or milk. Follow with milk of magnesia, beaten egg, or vegetable oil. Call physician immediately.

Eyes: Flush with water for 15 minutes and get prompt medical attention.

Batteries produce explosive gases. Keep sparks, flame, cigarettes, etc. away. Ventilate when charging or using in an enclosed space.

Always shield eyes when working near batteries.

KEEP OUT OF REACH OF CHILDREN.

⚠ WARNING

The gases given off by a battery are explosive. Any spark or open flame near a battery can cause an explosion, which will spray battery acid on anyone close to it. Should there be contact with battery acid, wash the affected area with large quantities of cool water and seek immediate medical attention.

NOTE: New Battery: Battery must be fully charged before use or battery life will be significantly reduced 10-30% of the battery's full potential.

To activate a new battery:

1. Remove vent plug from vent fitting. Remove cell caps.
2. Fill battery with electrolyte to upper level marks on case.
3. Set battery aside to allow for acid absorption and stabilization for 30 minutes.
4. Add electrolyte to bring level back to upper level mark on case.

NOTE: This is the last time that electrolyte should be added. If the level becomes low after this point, add only distilled water.

5. Charge battery at 1/10 of its amp/hour rating. Examples: 1/10 of 9 amp battery = .9 amp; 1/10 of 14 amp battery = 1.4 amp; 1/10 of 18 amp battery = 1.8 amp (recommended charging rates).

6. Check specific gravity of each cell with a hydrometer to assure each has a reading of 1.270 or higher.

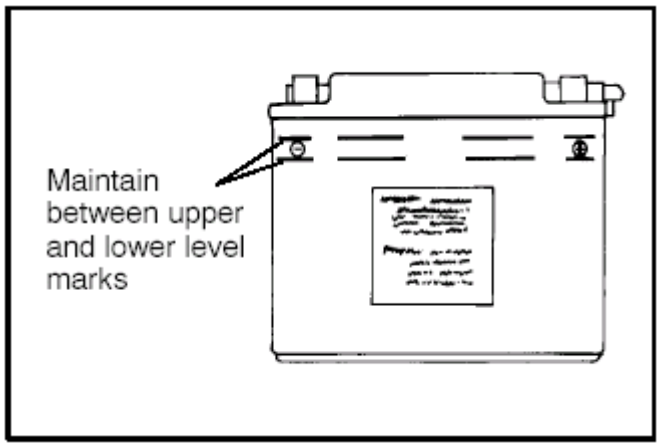
BATTERY TERMINALS/TERMINAL BOLTS

Use corrosion resistant grease on battery bolts. See Battery Installation.

CONVENTIONAL BATTERY INSPECTION/ REMOVAL

The battery is located under the seat and the right rear fender see **page 9.20**.

Inspect the battery fluid level. When the battery fluid nears the lower level, remove the battery and fill with *distilled water only* to the upper level line. To remove the battery:



1. Disconnect holder strap and remove covers.
2. Disconnect battery negative (-) (black) cable first, followed by the positive (+) (red) cable.

⚠ CAUTION

Whenever removing or reinstalling the battery, disconnect the negative (black) cable first and reinstall the negative cable last!

3. Remove the battery.
4. Remove the filler caps and add ***distilled water only*** as needed to bring each cell to the proper level. Do not overfill the battery.

⚠ CAUTION

Refill using only distilled water. Tap water contains minerals that are harmful to a battery.

⚠ CAUTION

Do not allow cleaning solution or tap water inside the battery. Battery life may be reduced.

5. Reinstall the battery caps.

CONVENTIONAL BATTERY INSTALLATION

1. Clean battery cables and terminals with a stiff wire brush. Corrosion can be removed using a solution of one cup water and one tablespoon baking soda.
Rinse well with clean water and dry thoroughly.
2. Route the cables correctly.
3. Reinstall battery, attaching positive (+) (red) cable first and then the negative (-) (black) cable. Coat terminals and bolt threads with Grease.
4. Install clear battery vent tube from vehicle to battery vent.

⚠ WARNING

Vent tube must be free from obstructions and kinks and securely installed. If not, battery gases could accumulate and cause an explosion. The vent tube should be routed away from frame and body to prevent contact with electrolyte. Avoid skin contact with electrolyte, as severe burns could result. If electrolyte contacts the vehicle frame, corrosion will occur.

5. Reinstall the holder strap.

CONVENTIONAL BATTERY TESTING

Whenever a service complaint is related to either the starting or charging systems, the battery should be checked first. Following are three tests which can easily be made on a battery to determine its condition: OCV Test, Specific Gravity Test and Load Test.

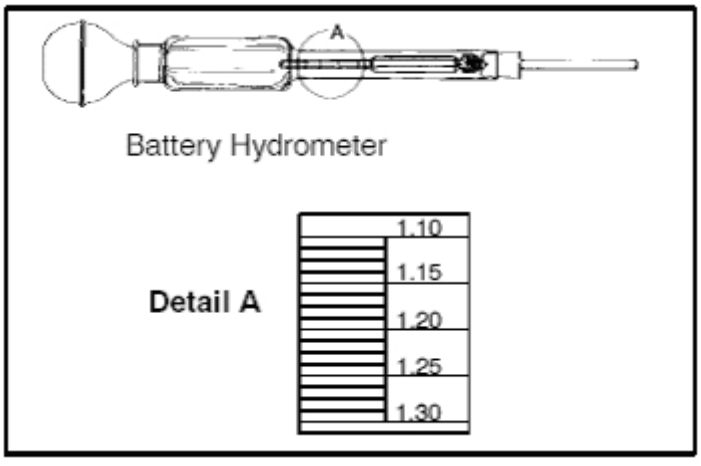
CONVENTIONAL BATTERY OCV - OPEN CIRCUIT VOLTAGE TEST

Battery voltage should be checked with a digital multitester. Readings of 12.6 volts or less require further battery testing and charging. See charts and Load Test on below.

NOTE: Lead-acid batteries should be kept at or near a full charge as possible. Electrolyte level should be kept between the low and full marks. If the battery is stored or used in a partially charged condition, or with low electrolyte levels, hard crystal sulfating will form on the plates, reducing the efficiency and service life of the battery.

CONVENTIONAL BATTERY SPECIFIC GRAVITY TEST

A tool such as a Battery Hydrometer can be used to measure electrolyte strength or specific gravity. As the battery goes through the charge/discharge cycle, the electrolyte goes from a heavy (more acidic) state at full charge to a light (more water) state when discharged. The hydrometer can measure state of charge and differences between cells in a multi-cell battery. Readings of 1.270 or greater should be observed in a fully charged battery. Differences ofmore than .025 between the lowest and highest cell readings indicate a need to replace the battery.



OPEN CIRCUIT VOLTAGE		
State of charge	Conventional Lead-acid	Low Maintenance Type
100%	12.60V	12.70V
75% Charged	12.40V	12.50V
50% Charged	12.10V	12.20V
25% Charged	11.8V	12.0V
0% Charged	Less than	Less than 11.9V

SPECIFIC GRAVITY		
State of charge*	Conventional lead-acid	Low Maintenance Type
100%	1.265	1.275
75% Charged	1.210	1.225
50% Charged	1.160	1.175
25% Charged	1.120	1.135
0% Charged	Less than 1.100	Less than 1.115

* At 28℃

NOTE: Subtract .01 from the specific gravity reading at 0℃.

CONVENTIONAL BATTERY LOAD TEST

⚠ CAUTION

To prevent shock or component damage, remove spark plug high tension leads and connect securely to engine ground before proceeding.

NOTE: This test can only be performed onmachines with electric starters. This test cannot be performed with an engine or starting system that is not working properly. A batterymay indicate a full charge condition in the OCV test and the specific gravity test, but still may not have the storage capacity necessary to properly function in the electrical system. For this reason, a battery capacity or load test should be conducted whenever poor battery performance is encountered. To perform this test, hook a multitester to the battery in the same manner as was done in the OCV test. The reading should be 12.6 volts or greater. Engage the starter and observe the battery voltage while cranking the engine. Continue the test for 15 seconds. During cranking the observed voltage should not drop below 9.5 volts. If the beginning voltage is 12.6 volts or higher and the cranking voltage drops below 9.5 volts during the test, replace the battery.

CONVENTIONAL BATTERY OFF SEASON STORAGE

To prevent battery damage during extended periods of non-use, the following basic battery maintenance items must be performed:

◎ Remove the battery from the machine and wash the case and battery tray with a mild solution of baking soda and water. Rinse with lots of fresh water after cleaning.

NOTE: Do not get any of the baking soda into the battery or the acid will be neutralized.

◎ Using a wire brush or knife, remove any corrosion from the cables and terminals.

◎ Make sure that the electrolyte is at the proper level. Add distilled water if necessary.

◎ Charge at a rate no greater than 1/10 of the battery's amp/hr capacity until the electrolyte's specific gravity reaches 1.270 or greater.

◎ Store the battery either in the machine with the cables disconnected, or store in a cool place.

NOTE: Stored batteries lose their charge at the rate of 1% per day. Recharge to full capacity every 30 to 60 days during a non-use period. If the battery is stored during the winter months, electrolyte will freeze at higher temperatures as the battery discharges. The chart below indicates freezing points by specific gravity.

Electrolyte Freezing Points	
Specific Gravity of Electrolyte	Freezing Point
1.265	-80℃ (-75° F)
1.225	-37℃ (-35° F)
1.200	-27℃ (-17° F)
1.150	-15℃ (+5° F)
1.100	-8℃ (+18° F)
1.050	-3℃ (+27° F)

CONVENTIONAL BATTERY CHARGING PROCEDURE

1. Remove the battery from the ATV to prevent damage from leaking or spilled acid during charging.
2. Charge the battery with a charging output no larger than 1/10 of the battery's amp/hr rating. Charge as needed to raise the specific gravity to 1.270 or greater.
3. Install battery in vehicle with positive terminal toward the front. Coat threads of battery bolt with a corrosion resistant dielectric grease.
4. Connect battery cables.

⚠ WARNING

To avoid the possibility of explosion, connect positive (red) cable first and negative (black) cable last.

5. After connecting the battery cables, install the cover on the battery and attach the hold down strap.
6. Install clear battery vent tube from vehicle to battery vent.

⚠ WARNING

Vent tube must be free from obstructions and kinks and securely installed. If not, battery gases could accumulate and cause an explosion. Vent should be routed away from frame and body to prevent contact with electrolyte. Avoid skin contact with electrolyte, as severe burns could result. If electrolyte contacts the vehicle frame, corrosion will occur.

7. Route cables so they are tucked away in front and behind battery.
8. Reinstall battery, attaching positive (+) (red) cable first and then the negative (-) (black) cable. Coat terminals and bolt threads with Dielectric Grease.
9. *(Conventional Lead/Acid Batteries Only)* Install clear battery vent tube from vehicle to battery vent.

⚠ WARNING

Vent tube must be free from obstructions and kinks and securely installed. If not, battery gases could accumulate and cause an explosion. Vent should be routed away from frame and body to prevent contact with electrolyte. Avoid skin contact with battery electrolyte, severe burns could result. If electrolyte contacts the vehicle frame, corrosion will occur.

10. Route cables so they are tucked away in front and behind battery.
11. Reinstall battery cover and holder strap.

⚠ CAUTION

Do not run the engine with the battery disconnected. Electrical components can become damaged.

Starter Relay

Take off the right side panel. The starter relay locates under right hand rear cab.

The starter relay consists of a simple 2-way circuit. Power is present at the (R/B) wire from the battery. Once the switching side of the relay receives power from the brake switch (G/Y) and a ground path from the starter button (G/R), battery power is sent to the starter motor to crank the engine.

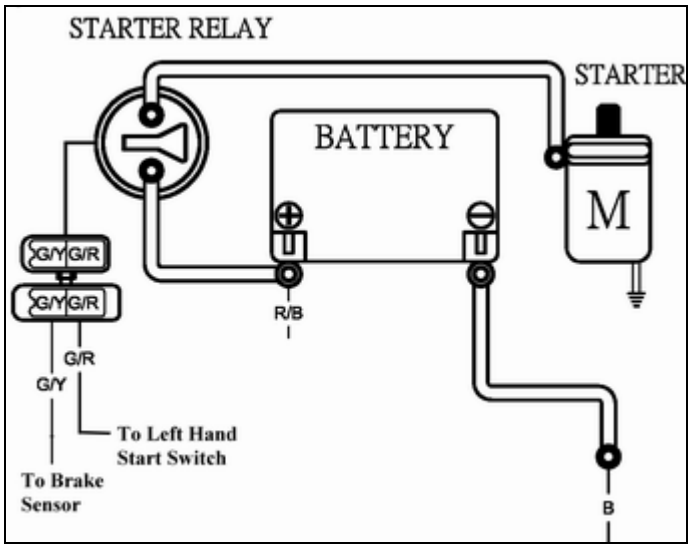
VOLTAGE DROP TEST

The Voltage Drop Test is used to test for bad connections. When performing the test, you are testing the amount of voltage drop through the connection. A poor or corroded connection will appear as a high voltage reading. Voltage drop shown on the meter when testing connections should not exceed 0.1 VDC per connection or component.

To perform the test, place the meter on DC volts and place the meter leads across the connection to be tested. Refer to the chart on next page to perform voltage drop tests on the starter system.

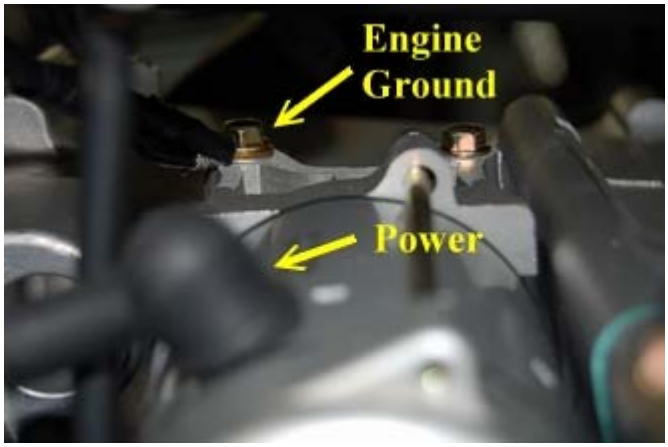
Voltage Drop should not exceed: 0.1 DC volts per connection

Use the illustration below when troubleshooting a “No Start” condition.



Starter Motor Service

The starter motor is a complete service part. If it is determined that the starter motor is the failed part, replace as needed. See the parts manual for correct part numbers.

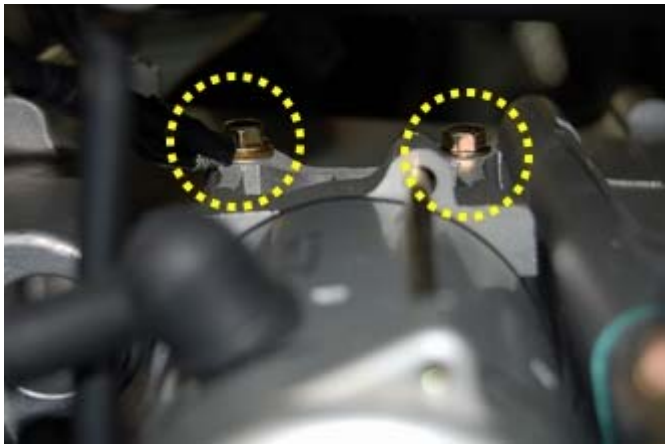


Starter Motor Disassembly

NOTE: Use only electrical contact cleaner to clean starter motor parts. Other solvents may leave a residue or damage internal parts and insulation.

NOTE: Some starter motors may not be serviceable. Replacement of entire assembly may be required. Check the parts manual for replacement part information.

1. Disconnect the negative battery cable and starter motor harness. Remove the (2) bolts from the starter and pull it from the engine.

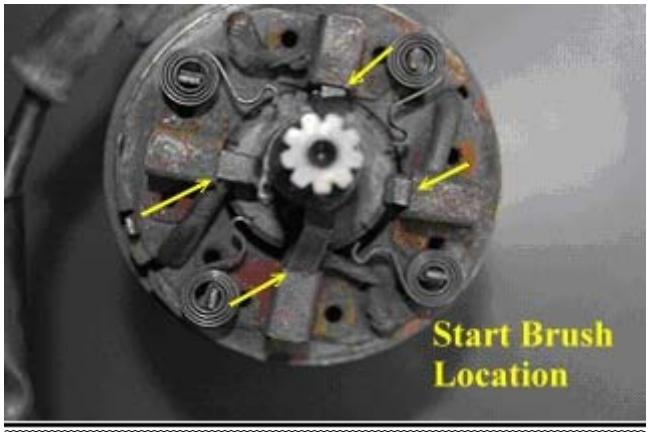


2. Remove the 2 main screws.

3. Remove magnet housing while holding the armature and brush holder section together.

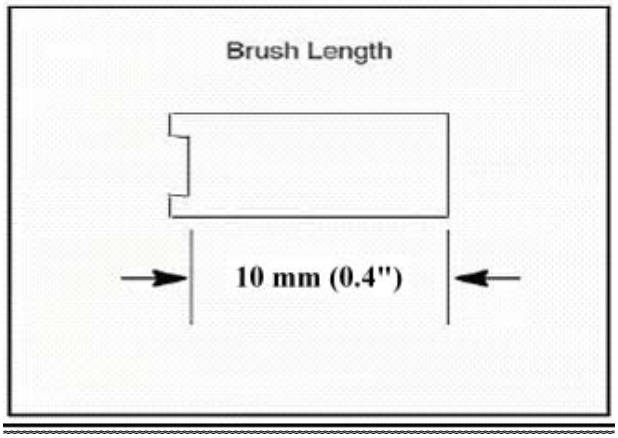
Starter Brush Inspection / Replacement

1. Release the brush coil spring away.
2. Push the armature out of case.



3. Using an Ohmmeter, measure the resistance between the cable terminal and the insulated brush. The reading should be .3 ohms or less. Measure the resistance between the cable terminal and brush housing. Make sure the brush is not touching the case. The reading should be infinite (no reading).
4. Remove the brush plate and brushes. Measure the brush length and replace if worn past the service limit.

Brush Length Service Limit
10 mm (0.40“)



5. Inspect the surface of the commutator for wear or discoloration. See Armature Test.

4. Be sure that the terminal bolt insulation washer is properly seated in the housing and the tab on the brush plate engages the notch in the brush plate housing.

Armature Test

1. Inspect surface of commutator. Replace if excessively worn or damaged.

2. Using a digital multi-tester, measure the resistance between each of the commutator segments. The reading should be 3 ohms or less.

3. Measure the resistance between each commutator segment and the armature shaft. The reading should be infinite. (no continuity)

4. Check commutator bars for discoloration. Bars discolored in pairs indicate shorted coils, requiring replacement of the starter motor.

5. Place armature in a growler. Turn growler on and position a hacksaw blade or feeler gauge lengthwise 3mm(1/8〃) above armature coil laminates. Rotate armature 360°. If hacksaw blade is drawn to armature on any pole, the armature is shorted and must be replaced.

6. Inspect the permanent magnets in starter housing. Make sure they are not cracked or separated from housing.

CAUTION
Use care when handling the starter housing. Do not drop or strike the housing, as magnet damage is possible. If the magnets are damaged, the starter must be replaced.

Starter Reassembly

1. Place armature in field magnet casing.

2. Inspect and replace the O-rings if damaged.

3. Install case sealing O-ring. Make sure O-ring is in good condition and not twisted on the case. Lubricate the ends of the armature shaft and oil seal with a light film of grease, and install housing.

4. Pushing back brushes while installing armature shaft. Install the coil spring behind brush.

5. Reinstall starter motor housing screws and washers. Make sure O-rings are in good condition and seated in groove. Tighten sufficiently.

6. Reinstall the starter motor to the engine.

STARTER SYSTEM TESTING

Condition: Starter fails to turn motor. **NOTE:** Make sure engine crankshaft is free to turn before proceeding with dynamic testing of starter system. A digital multitester must be used for this test.

With the tester on the VDC position, place the tester's black lead on the battery negative and the red lead on the battery positive. Reading should be 12.4 volts or greater

NO → Remove battery and properly service. Install fully charged shop battery to continue test.

YES

Disconnect R/B engagement wire from the starter relay. Connect tester black wire to battery ground. Connect red tester lead to R/B harness wire at relay. Turn on ignition switch and depress the starter button. Tester should read battery voltage.

NO → Check voltage on both sides of circuit breaker, ignition switch/engine stop switch, starter button and brake switches. The voltage on both sides should be the same. **NOTE:** The ignition switch and engine stop switch must be on, the starter button and brake depressed. Replace the defective component.

YES → Test starter relay coil by connecting an ohmmeter between the coil leads. Resistance should be 3.4.±1 . Check relay ground path by measuring resistance between the G/Y harness wire and battery negative terminal (-).

Reconnect the solenoid. Connect the tester black lead to the battery positive and the red lead to the relay end of the battery-to-relay wire. Depress starter button. Reading should be less than.1 V D.C.

NO → Clean the battery-to-solenoid cable ends or replace the cable.

YES

Connect the black tester lead to relay end of battery-to-relay cable. Connect red tester lead to relay end of relay-to-starter cable. Depress starter button. Reading should be less than .1 V D.C.

NO → Replace the starter relay.

YES

Connect the black tester lead to the relay end of the relay-to-starter cable. Connect the red tester lead to the starter end of the same cable. Depress the starter button. Reading should be less than .1 V D.C.

NO → Clean the relay-to-starter cable ends or replace the cable.

YES

If all of these indicate a good condition, yet the starter still fails to turn, the starter must be removed for static testing and inspection.

STARTER SYSTEM TROUBLESHOOTING

Starter Motor Does Not Turn

◎ Battery discharged - low specific gravity

◎ Loose or faulty battery cables or corroded connections (see Voltage Drop Tests)

◎ Related wiring loose, disconnected, or corroded

◎ Poor ground connections at battery cable, starter motor or starter solenoid (see Voltage Drop Tests)1

◎ Faulty starter button

◎ Faulty ignition switch (Do other systems function?)

◎ Faulty starter relay starter motor.

◎ Engine problem - seized or binding (Can engine be rotated easily with recoil starter?)

Starter Motor Turns Over Slowly

◎ Battery discharged - low specific gravity

◎ Excessive circuit resistance – poor connections (see Voltage Drop Test below)

◎ Engine problem - seized or binding (Can engine be rotated easily with recoil starter?)

◎ Faulty or worn brushes in starter motor

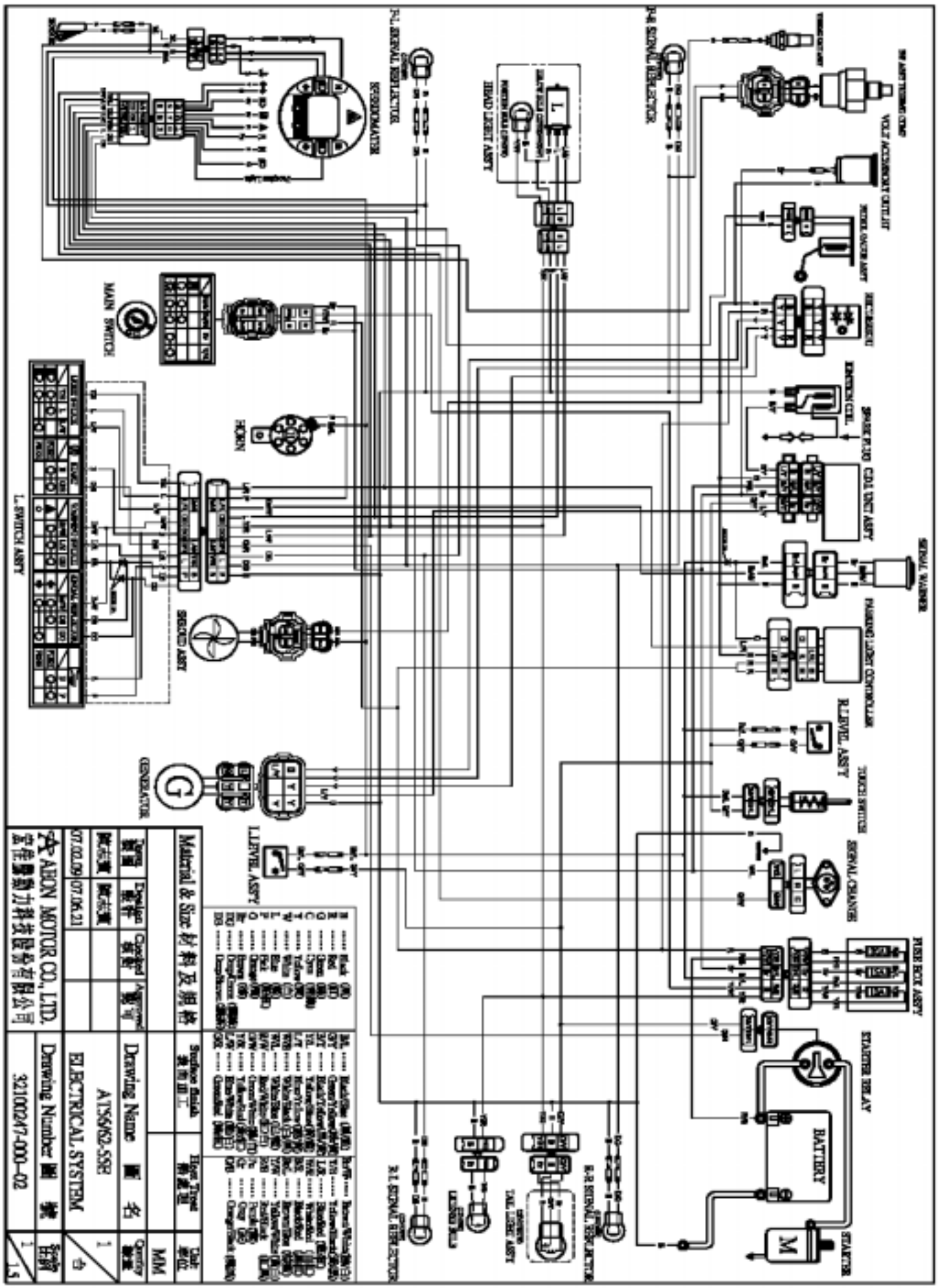
◎ Automatic compression release inoperative

Starter Motor Turns - Engine Does Not Rotate

◎ Faulty starter one way

◎ Faulty starter one way gears or starter motor gear

◎ Faulty one way gear or loose flywheel


Material & Size 材料及規格
Surface finish 表面加工
Heat Treat 熱處理
Drawing Name 圖名
ATS6K2-5SR
ELECTRICAL SYSTEM
Drawing Number 圖號
32100247-000-02
Quantity 數量
Unit 單位
Scale 比例
Designed 設計
Checked 審核
Approved 核准
Date 日期
07.02.09
07.06.21
AEON MOTOR CO., LTD.
宏佳騰動力科技股份有限公司
MAIN SWITCH
HORN
IGNITION COIL
SPARK PLUG
SIGNAL WARNER
FUSE BOX ASSY
STARTER RELAY
BATTERY
STARTER
GENERATOR
REGULATOR
HEAD LIGHT ASSY
L SWITCH ASSY
R SWITCH ASSY
L LEVER ASSY
R LEVER ASSY
SPEEDOMETER ASSY
TOUCH SWITCH
SIGNAL CHANGER
HAZARD CONTROLLER
L SIGNAL RELAY
R SIGNAL RELAY
TAIL LIGHT ASSY
VOLT ACCESSORY OUTLET